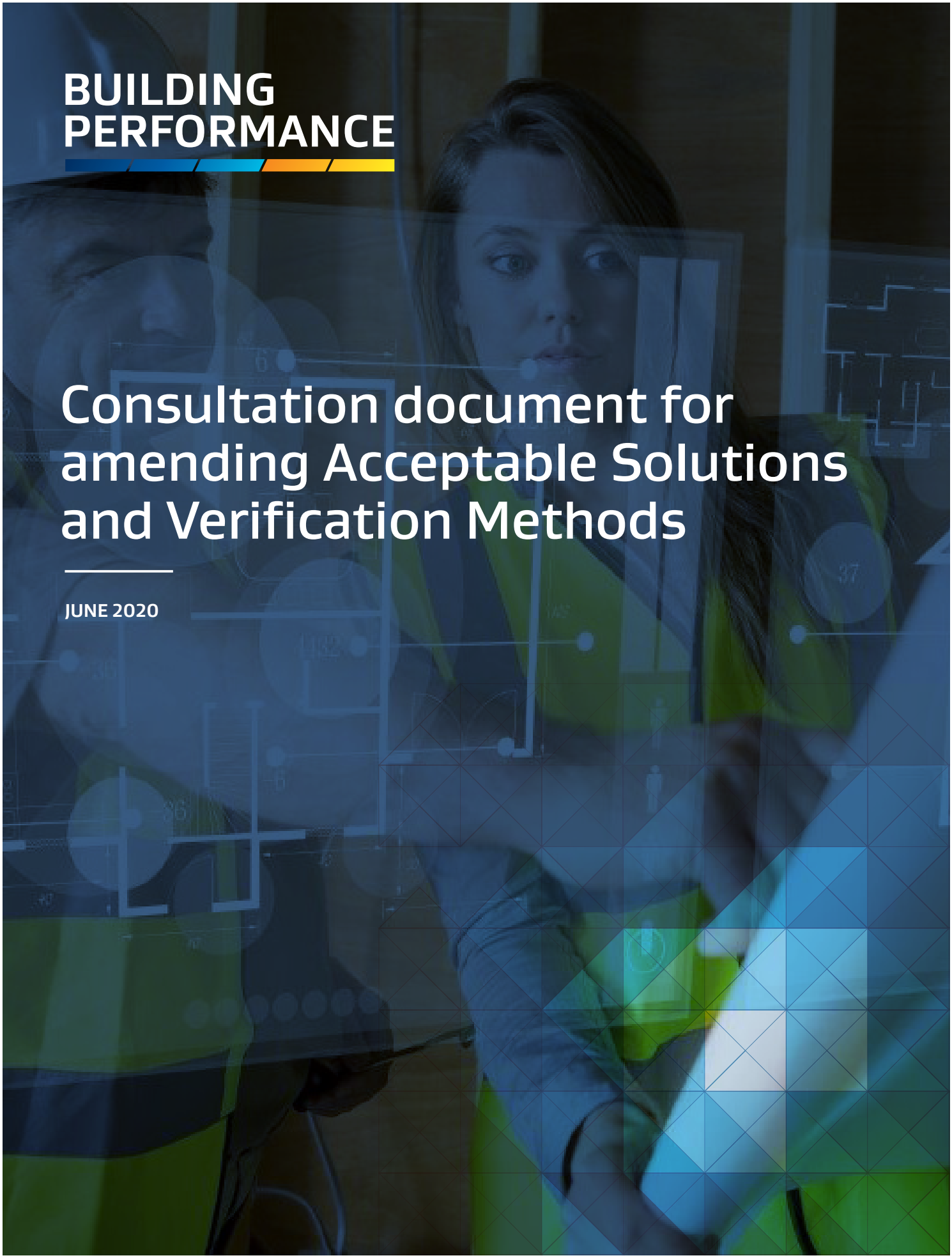
BUILDING PERFORMANCE

# Consultation document for amending Acceptable Solutions and Verification Methods

JUNE 2020



MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand Government



Published February 2020 by

Ministry of Business, Innovation and Employment
PO Box 1473
Wellington 6140
New Zealand

ISSN 2703-4046 (online)

This publication is also available on the MBIE website at www.mbie.govt.nz/building-code-consultation

# Background

The primary legislation governing building work in New Zealand is the Building Act 2004 and the New Zealand Building Code. These documents ensure buildings in New Zealand are suitable for people to use and occupy and contribute to the health and wellbeing of occupants and supporting sustainable development. The Government's goal is for a more efficient and productive building industry that builds it right the first time and stands behind the quality of its work. To help achieve this, MBIE seeks to ensure that the Building Code clauses, Acceptable Solutions, and Verification Methods reflect the latest research, knowledge and building practices.

## Continuous improvement of the Building Code

The Building Code (including its associated documents) aims to keep pace with modern construction methods and reflects present society. To achieve this, the Ministry of Business, Innovation and Employment (MBIE) holds biannual consultations and reviews of the Building Code.

MBIE consults on Building Code changes every February and August. The consultation runs for six weeks, and stakeholders are invited to make submissions through the MBIE website on a range of issues raised for discussion.

After the consultation closes and all submissions are analysed, updates are published in June and November each year.

MBIE is committed to updating the Building Code and its documents so we can keep pace with innovation, current construction methods and the needs of our modern society. This also provides clarity, certainty and consistency within the New Zealand building and construction sector.

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This is your chance to have your say. Let us know what you think about the current proposals through the consultation process.

**Dave Robson**
Manager, Building Performance and Engineering

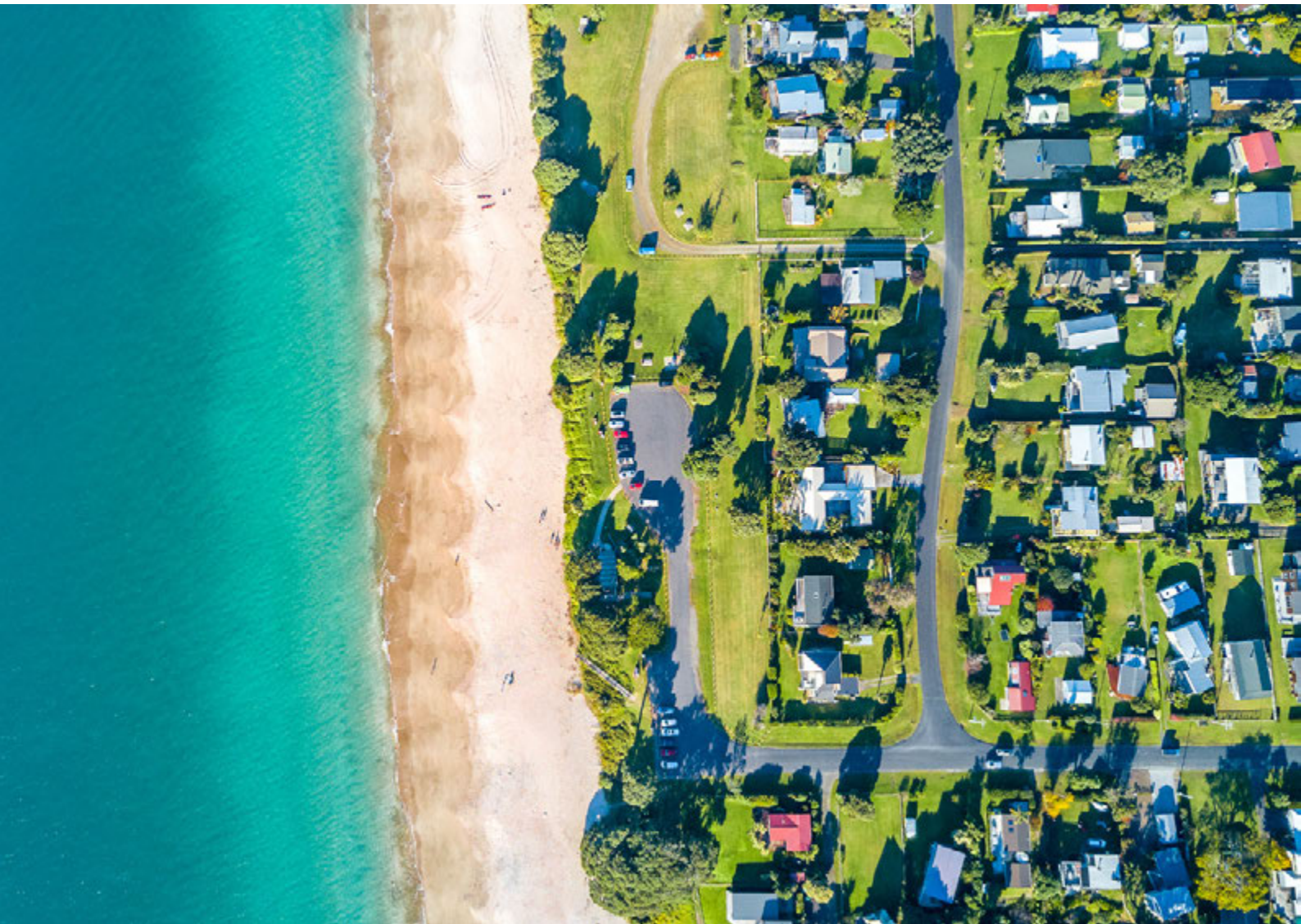
# Seeking feedback on the Building Code update

In this consultation, we seek your feedback on proposals to amend the following Acceptable Solutions and Verification Methods:

- C1-6 Protection from Fire: C/VM2, C/AS1, C/AS2
- E1 Surface Water: E1/VM1, E1/AS1, and new Acceptable Solution E1/AS2
- E2 External moisture: E2/AS1
- E3 External moisture: E3/AS1 and new Acceptable Solution E3/AS2
- G9 Electricity: G9/VM1, G9/AS1
- G13 Foul Water: G13/AS1, G13/AS2, G13/AS3

Standards referenced in these proposals are available for inspection free of charge from MBIE, 15 Stout Street, Wellington (please ring 0800 242 243 to arrange an appointment). New Zealand Standards are available to purchase from Standards New Zealand, 15 Stout Street, Wellington or online at www.standards.govt.nz.

The Waterproofing Membrane Association Inc. (WMAI) code of practice for Internal Wet-area Membrane Systems (IWAM) is available for free and found here.



# How to provide feedback

We invite your feedback on the proposed changes found in this document by 4pm, Friday 17 April 2020.

- You can complete an online submission form or download the form at www.mbie.govt.nz
- Or, you can send your submission by email or post.
  - **email to:** buildingfeedback@mbie.govt.nz, with subject line *Building Code update consultation June 2020*
  - **post to:** Ministry of Business, Innovation and Employment, 15 Stout Street, Wellington 6011
  - **or:** Ministry of Business, Innovation and Employment, PO Box 1473, Wellington 6140

Your feedback will contribute to updating the Acceptable Solution and Verification Method documents. It 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.

# C1–C6 Protection from Fire

**PROPOSAL** **MBIE propose to amend C/VM2**

1. Cladding requirements: Amend fire testing requirements for cladding systems to reference large scale international test standards and close existing gaps between C/VM2 and C/AS2
2. Horizontal fire spread: Amend the horizontal fire spread requirements in design scenario 'Horizontal Fire Spread' (HS)
3. Editorial: Amend text in C/VM2 to include text from the document Commentary for Building Code Clauses C1-C6 and Verification Method C/VM2.

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause C/VM2 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause C/VM2?

## C/VM2 – ITEM 1: Cladding requirements: Amend fire testing requirements for cladding systems to reference large scale international test standards and close existing gaps between C/VM2 and C/AS2

Significant high-rise fire events globally have increased the fire engineering community's understanding of how fire spreads externally and within modern facade construction. This has highlighted the need for MBIE to reconsider fire testing protocols for cladding systems. The first step of this review was the release of the MBIE guidance Fire performance of external wall cladding systems in February 2019. The next step includes this proposal, which will amend C/VM2 to incorporate the large scale test methods. This proposal also contains further amendments to C/VM2, to better align its cladding requirements with those of C/AS2.

**MBIE expects the impacts of the proposed changes will be to:**

› Ensure the minimum level of performance expected by the Building Code is achieved

› Expand the suite of cited test standards to those most commonly used in other markets and expand the access of products to the country while still maintaining an appropriate level of safety

› Improve consistency in the way that fire safety compliance is demonstrated

› Provide certainty of the requirements for testing cladding systems

Link to appendix

## C/VM2 – ITEM 2: Horizontal fire spread: amend the horizontal fire spread requirements to align C/VM2 with C/AS2

C/VM2 Design scenario 'Horizontal Fire Spread' (HS) is intended to limit fire spread from the subject building to neighbouring buildings. Acceptable Solution C/AS2 contains similar requirements. However, the C/VM2 requirements permit designers to provide an automatic sprinkler system supplied by two independent water supplies for firecells not containing a storage occupancy as a means to comply. For buildings less than 1 m from a boundary, the received radiation from a fire may not meet the values specified by the Building Code clause C3.6 and reliance on a sprinkler system may not adequately consider the reliability and redundancy of the systems to control fire spread. An amendment is proposed to C/VM2 design scenario HS to maintain the same performance setting as C/AS2 and remove the inconsistency between the documents. Further amendments are required for design scenario HS to clarify the Verification Method.

Link to appendix

## C/VM2 – ITEM 3: Editorial: Amend text in C/VM2 to include text from the document Commentary for Building Code Clauses C1–C6 and Verification Method C/VM2

Several paragraphs of C/VM2 directly reference text within the document Commentary for Building Code Clauses C1–C6 and Verification Method C/VM2. It is more appropriate to locate this text in C/VM2, so MBIE proposes to copy it from the Commentary document into C/VM2. Additional amendments are proposed to the References section which changes the way that secondary referenced documents are treated, which will align with the way that C/AS2 treats them.

Link to appendix

# C1–C6 Protection from Fire

**PROPOSAL** **MBIE propose to amend C/AS1**

1. 1. Scope of C/AS1 and risk groups: Amend the scope of C/AS1, including the description of risk groups, to provide clarity on the scope of Acceptable Solutions C/AS1 and C/AS2

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause C/AS1 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause C/AS1?

## C/AS1 – ITEM 1: Scope of C/AS1 and risk groups: Amend the scope of C/AS1, including the description of risk groups, to provide clarity on the scope of Acceptable solutions C/AS1 and C/AS2

Acceptable Solution C/AS1 covers residential buildings where people sleep and outbuildings. C/AS1 is a simplified compliance pathway for small residential homes, however, it also includes some multi-unit dwellings. As modern construction of multi-unit dwellings becomes more unique, and complex designs increase, the technical requirements of C/AS1 do not address all the associated fire risks for these types of low-rise multi-unit residential buildings. This amendment is required to clarify the scope of the document and clarify the limitations of its use.

**The expected impacts of the changes are to:**

- Provide greater consistency, clarity and certainty to designers, builders and consent officers in the building consent process
- Ensure that fire safety risks in multi-unit dwellings are reduced. This means that some types of low-rise multi-unit dwellings will fall outside the scope of C/AS1 and will instead be included in the scope for C/AS2

Link to appendix

# C1–C6 Protection from Fire

**PROPOSAL** **MBIE propose to amend C/AS2**

1. Scope of risk groups: Amend the scope of the risk group SH to provide clarity on the scope of Acceptable solutions C/AS1 and C/AS2
2. Means of escape: Amend the means of escape requirements to improve clarity and consistency of application of C/AS2
3. Group sleeping areas: Amend requirements for group sleeping areas ensuring spaces are provided with adequate fire safety
4. Cladding requirements: Amend fire testing requirements for cladding systems to reference large scale international test standards and align C/AS2 and C/VM2
5. Control of external fire spread: Amend requirements for control of external fire spread to enhance clarity and usability of the document
6. Firefighting: Amend requirements for firefighting operations to enable more efficient and effective fire service response and better align the requirements between Fire Emergency NZ (FENZ) operational requirements and the Building Code
7. Editorial: Amend text throughout the document to provide further clarity of requirements
8. Errata from 2019: Amend text in three locations (previously issued as an Errata to C/AS2 in October 2019)

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause C/AS2 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause C/AS2?

## C/AS2 – ITEM 1: Scope of risk groups: Amend the scope of the risk group SH to provide clarity on the scope of Acceptable solutions C/AS1 and C/AS2

The proposed amendment to Acceptable Solution C/AS2 will ensure that the scopes of both C/AS1 and C/AS2 are clear. Further details of this amendment are included in C/AS1 – Item 1 (link).

Link to appendix

## C/AS2 – ITEM 2: Means of escape: Amend means of escape requirements to improve clarity and consistency of application of C/AS2

Proposed amendments to means of escape requirements will improve the clarity and consistency of how the Acceptable Solution is applied. Amendments eliminate conflicting requirements with other code clauses such as D1 (Access routes).

Link to appendix

## C/AS2 – ITEM 3: Group sleeping areas: Amend C/AS2 to ensure that there is clarity in the regulations, and that these spaces are provided with adequate fire safety measures

Proposed amendments provide clarity on specific requirements for group sleeping areas and improve how these areas are defined.

This clarifies the distinction between household units (where occupants are familiar with the layout) and suites (transient accommodation), and removes the term 'suite' for risk group SI (care and detention).

Proposed restrictions are included to prevent the subdivision of group sleeping areas into completely separate occupied rooms or spaces. Further, the proposed changes provide more clarity on the restrictions of activities allowed in group sleeping areas.

Link to appendix

## C/AS2 – ITEM 4: Cladding requirements: Amend fire testing requirements for cladding systems to reference large scale international test standards and align C/AS2 and C/VM2

This is an amendment to incorporate large scale fire test methods for cladding systems into C/AS2. Further details of this amendment are included in C/VM2 – Item 1. Additional amendments are also required in C/AS2 to align the new proposed cladding requirements with other sections of the text.

Link to appendix

## C/AS2 – ITEM 5: Control of external fire spread: Amend the requirements for control of external fire spread to enhance clarity and usability of the document

Part 5 of C/AS2 is the control of external fire spread and relates to the protection of fire from one property to another. Editorial and minor changes are required to C/AS2 Part 5 to maintain consistency of the text and formatting within the document and with similar requirements found in C/AS2.

Link to appendix

## C/AS2 – ITEM 6: Firefighting: Amend requirements for firefighting operations to provide more efficient and effective fire service response, and better align the requirements between Fire and Emergency NZ and the Building Code

Amendments to C/AS2 are proposed to update the firefighting provisions to align with current Fire and Emergency New Zealand (FENZ) resources and procedures. Providing building design features that are currently placed in Standards, and aligning aspects of the FENZ' operational procedures within the AS will provide consistency and clarity for the sector. The proposed change will also include details of how to measure the hose run to determine the need for a building hydrant.

Link to appendix

## C/AS2 – ITEM 7: Editorial: Amend text throughout the document to provide further clarity of the requirements

A number of editorial changes are proposed for C/AS2. This includes the reordering of paragraphs as a result of new/altered requirements.

The amendments also include clarifications where fire safety requirements overlap with requirements from other code clauses and removing duplication leading to inconsistencies.

Link to appendix

## C/AS2 – ITEM 8: Errata from 2019: Amend text in three locations (previously issued as an Errata to C/AS2 in October 2019)

On 27 June 2019, the Ministry of Business, Innovation and Employment (MBIE) published the C/AS2 (Acceptable Solution for Buildings other than Risk Group SH) for Protection from Fire.

The document combined what were previously six separate Acceptable Solutions for fire into one. Although every attempt was made to ensure the new document was correct, some unintentional errors occurred. Three priority corrections were made to C/AS2 on 31 October 2019 to coincide with the end of the transition period.

These were:

1. Within the scope for risk group WB, under 'Storage activities such as', a typo was made including the word 'no'
2. Re-inserting the requirement for a Type 9 in Table 2.2b for buildings in risk group CA with an occupant load between 251 and 1000 people, and an escape height between 4 and 10 metres
3. Amending Table 2.2c to allow for the substitution of a Type 3 with additional smoke detectors where the environment might be too challenging for a Type 4. With the development of the new table in the 2019 C/AS2, key footnotes were erroneously left out. Where the occupant load is 100 to 250 and 251 to 1000, and the escape height is between 0 and <4 metres (four fields altogether), footnote 4 should be added to allow for this substitution. Each of the four boxes should read: $4^{4,5,6}$, $18^{7}$.

Link to appendix

# E1 Surface water

**PROPOSAL** **MBIE proposes to amend Acceptable Solution E1/AS1, Verification Method E1/VM1, and issue a new Acceptable Solution E1/AS2.**

1. E1/AS2: Issue a new Acceptable Solution which references AS/NZS 3500.3 *Stormwater drainage,* with modifications, as a means of compliance with NZBC clause E1 *Surface Water*
2. Rainfall intensities : Amend E1/AS1 Appendix A to replace the rainfall intensity maps with a table that provides location specific rainfall intensity data
3. Referenced Standards: Amend E1/VM1 and E1/AS1 to update references to product manufacturing and installation Standards
4. Editorial: Correct a spelling mistake in E1/AS1

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause E1 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause E1?

## ITEM 1 – E1/AS2: Issue a new Acceptable Solution which references AS/NZS 3500.3 Stormwater drainage, with modifications, as a means of compliance with NZBC clause E1 *Surface Water*

MBIE propose to issue a new Acceptable Solution as a means of compliance with NZBC clause E1 *Surface Water.* E1/AS2 will reference AS/NZS 3500.3:2018 *Stormwater drainage,* with modifications, as an Acceptable Solution for surface water drainage installations.

**This new Acceptable Solution is intended to:**

- Increase 'deemed to comply' options for sizing and designing roof gutters and surface water drainage systems
- Introduce new 'deemed to comply' design and installation solutions for:
  - on-site stormwater detention systems (partial solution)
  - pumped stormwater systems
  - siphonic roof water drainage systems
- Introduce informative installation provisions for subsoil drainage systems
- Provide 'deemed to comply' design and installation solutions for surface water and roof water drainage systems that fall outside the scope of the current Verification Method and Acceptable Solution
- Allow for consenting efficiency when stormwater drainage systems are designed using AS/NZS 3500.3:2018 as the design would no longer need to be treated as an Alternative Solution by Building Consent Authorities

A number of modifications to AS/NZS 3500.3:2018 *Stormwater drainage* are proposed to be included within E1/AS2 to reduce inconsistencies with the performance criteria of NZBC clause E1, requirements within E1/AS1 and accepted industry practice.

Supplementary updates: Item 1a – Contents, References and Definitions

Link to appendix

## ITEM 2 – RAINFALL INTENSITIES: Amend E1/AS1 Appendix A to replace the rainfall intensity maps with a table that provides location specific rainfall intensity data

The existing rainfall intensity maps in E1/AS1 Appendix A are proposed to be replaced with a table listing specific design rainfall intensities for approximately 250 NZ towns and cities.

The rainfall intensities in the proposed new rainfall intensity table have been produced by the National Institute for Water and Atmospheric Research's (NIWA) and are based on historical rainfall data derived from HIRDSv4 (hirds.niwa.co.nz).

**This new rainfall intensity table is intended to:**

- Ensure that the rainfall intensity data within E1/AS1 Appendix A is current and up to date
- Ensure that surface water drainage systems designed using the rainfall intensity data within E1/AS1 Appendix A are appropriately sized to meet the performance criteria of NZBC clause E1 *Surface Water*
- Reduce the risk of user error when selecting an appropriate design rainfall intensity – it is easier to select from a table as opposed to interpolating from a contoured map

Supplementary updates:
Item 2a – Amend the reference to Appendix A within E1/AS1
Item 2b – Provide definition for Annual Exceedance Probability (AEP)
Item 2c – Amend an informative comment regarding NIWA's High Intensity Rainfall Design System (HIRDS) within E1/VM1

Link to appendix

## ITEM 3 – REFERENCED STANDARDS: Amend E1/VM1 and E1/AS1 to update references to product manufacturing and installation Standards

MBIE propose to update a number of E1/VM1 and E1/AS1 referenced Standards to align with those currently used for the manufacturing and installation of surface water drainage system components.

Link to appendix

## ITEM 4 – EDITORIAL: Correct a spelling mistake in E1/AS1

Link to appendix

# E2 External Moisture

**PROPOSAL** **MBIE proposes to amend existing references within Acceptable Solution E2/AS1, to support the introduction of Acceptable Solution E1/AS2 (proposal to cite AS/NZS 3500.3:2018 *Stormwater drainage*)**

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause E2 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause E2?

## ITEM 1: Align E2/AS1 with new E1 Acceptable Solution E1/AS2 for the design of gutters, downpipes and spreaders

Minor changes to E2/AS1 are proposed, to support the introduction of Acceptable Solution E1/AS2.

Existing E2/AS1 references to E1/AS1 are proposed to be updated to reference NZBC clause E1 Surface Water, which will support the use of the proposed new Acceptable Solution E1/AS2.

Link to appendix

# E3 Internal Moisture

**PROPOSAL** **MBIE proposes to amend Acceptable Solution E3/AS1 and issue a new Acceptable Solution E3/AS2.**

1. Overflow from free water: Amend the provisions in E3/AS1 for overflow from free water in adjoined household units to provide more flexibility by allowing the use of integrated overflows in sanitary fixtures
2. Internal wet area membranes: Issue a new Acceptable Solution (E3/AS2) for using internal wet area membranes in situations such as tiled bathroom floors and showers
3. Align E3/AS1 and E3/AS2: Amend some provisions of E3/AS1 to remove less reliable construction options and to align with the proposed E3/AS2

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause E3 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause E3?

## ITEM 1: Overflow from free water: Amend the requirement for overflow from free water in adjoined household units to provide clarity

Provide new provisions for the use of integrated sanitary fixture overflows as an alternative to the use of floor wastes and clarify that component failures such as burst pipes are not seen as an accidental overflows. This change could in some situations remove the requirement to install floor wastes in kitchens and laundries to protect adjoining units from damage from free water.

**The expected impacts of the changes are to:**

› Reduce firecell and acoustic penetrations in higher density housing

› Avoid risks of noxious waste gases from dried traps

Link to appendix

## ITEM 2 – E3/AS2: Issue an Acceptable Solution for internal wet area membranes and tiled showers (E3/AS2)

The proposal is to cite the Waterproofing Membrane Association Inc (WMAI) Code of Practice for Internal Wet-area Membrane Systems (IWAM) as an Acceptable Solution for relevant parts of NZBC clauses E3.3.2-3.3.6.

The proposed changes:

- Provide designers and BCAs with clear and robust information on the use of internal wet area membranes
- Provide clarity on test methods for wet area membranes (AS/NZS 4858)

Link to appendix

## ITEM 3 – ALIGN E3/AS1 AND E3/AS2: Amend E3/AS1 in association with the proposed E3/AS2 for wet area membranes

In conjunction with the introduction of the new Acceptable Solution E3/AS2 for internal wet-area membranes, amendments will be made to E3/AS1.

The proposed changes will result in more robust provisions for some aspects of the materials, finishes and detailing for interior areas of buildings adjacent to sanitary fixtures or sanitary appliances, or likely to be splashed in the course of the intended use of the building.

Link to appendix

# G9 Electricity

**PROPOSAL** **MBIE proposes amending Verification Method G9/VM1 and Acceptable Solution G9/AS1.**

1. Electricity (Safety) Regulations 2010: Reference the Electricity (Safety) Regulations 2010 in G9/VM1 and G9/AS1
2. **New comment on electrical exemptions:** Amend G9/AS1 to add a new comment box clarifying which domestic electrical installations are exempted from requiring an authorised person under the Electricity Act 1992
3. **Accessibility:** Amend G9/AS1 requirements for light switches and plug sockets used by a person with a disability

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause G9 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause G9?

## ITEM 1 – ELECTRICITY (SAFETY) REGULATIONS 2010: Reference the Electricity (Safety) Regulations 2010 in G9/VM1 and G9/AS1

The proposed new reference to the Electricity (Safety) Regulations 2010 will ensure that the Building Code requirements for electrical work are consistent with WorkSafe requirements. The Verification Method for G9 Electricity currently requires electrical installations to comply with specific standards. The Electricity (Safety) Regulations 2010 reference more up-to-date Standards.

Electrical work is regulated by the Electricity Act 1992. The act includes the Electricity (Safety) Regulations 2010 which:

- Summarises the generic rules and requirements for electrical safety and what is deemed to be electrically safe and unsafe
- Regulates the design, construction, installations, fittings and appliances
- Specifies electrical work to be designed and installed under AS/NZS 3000
- Defines the standards applicable to the regulations, focusing on adopting international standards

The proposed change ensures consistency amongst deemed to comply documents that is in-line with the Electricity Act 1992 and industry practice.

Link to appendix

## ITEM 2 – NEW COMMENT ON ELECTRICAL EXEMPTIONS: Amend G9/AS1 to add a new comment box clarifying which domestic electrical installations are exempted from requiring an authorised person under the Electricity Act 1992

The current Acceptable Solution G9/AS1 Paragraph 1.0.1 requires electrical installations within domestic dwellings to comply with the New Zealand Electrical Code of Practice (NZECP 51). However, because there is a lack of understanding from home owners as to why the compliance with NZECP 51 must be met, it is proposed to add a new comment box to clarify the reason for this requirement.

Link to appendix

## ITEM 3 – ACCESSIBILITY: Amend G9/AS1 requirements for light switches and plug sockets used by a person with a disability

Amend Paragraph 2.0.1 in G9/AS1 to align with NZS 4121:2001.

Link to appendix

# G13 Foul water

**PROPOSAL** **MBIE proposes to amend Acceptable Solutions G13/AS1, G13/AS2, and G13/AS3**

1. Modify Standard AS/NZS 3500.2: Amend G13/AS3 to modify two additional clauses within AS/NZS 3500.2:2018 *Sanitary plumbing and drainage*
2. Referenced Standards: Amend G13/AS1 and G13/AS2 to update references to product manufacturing and installation Standards
3. Remove G13/AS3 Standard reference: Amend G13/AS3 to remove the reference to AS/NZS 2032:2006 *Installation of PVC pipe systems* as this Standard is referenced within all other Acceptable Solutions for NZBC clause G13
4. Editorial: Amend G13.2, G13/AS1 and G13/AS2 to correct cross referencing and spelling errors

**QUESTIONS**

Q1. Do you support the Acceptable Solutions and Verification Methods for NZBC clause G13 to be amended as proposed?

Q2. What impacts (economic, efficiency etc) on your business do you expect from the proposed amendments to the Acceptable Solutions and Verification Methods for NZBC clause G13?

## ITEM 1 – MODIFY STANDARD AS/NZS 3500.2: Amend G13/AS3 to modify two additional clauses within AS/NZS 3500.2:2018 *Sanitary plumbing and drainage*

The proposal amends Acceptable Solution G13/AS3 to modify two additional clauses to the referencing of AS/NZS 3500:2018 Part 2 - *Sanitary plumbing and drainage.*

The new modifications are intended to ensure that the normative text with AS/NZS 3500:2018 Part 2 supports the changes made in 2018 to figure 4.9.1 (a) 45° *Junction at grade* to reduce the probability of blockages within drains occurring.

Link to appendix

## ITEM 2 – REFERENCED STANDARDS: Amend G13/AS1 and G13/AS2 to update references to product manufacturing and installation Standards

The proposal updates a number of Standard references within G13/AS1 and G13/AS2 to align with those currently used for product manufacturing and installation of sanitary plumbing and foul water drainage system components.

Supplementary update:
Item 2a - Amend references to BS EN 12380 within G13/AS1

Link to appendix

## ITEM 3 – REMOVE G13/AS3 STANDARD REFERENCE: Amend G13/AS3 to remove the reference to AS/NZS 2032:2006 *Installation of PVC pipe systems* as this Standard is referenced within all other Acceptable Solutions for NZBC clause G13

The proposal amends Acceptable Solution G13/AS3 by deleting paragraph 1.0, which references AS/NZS 2032:2006 *Installation of PVC pipe systems* as an Acceptable Solution for the installation of PVC-U pipe and fittings.

The G13/AS3 referencing of AS/NZS 2032:2006 is no longer required, as this Standard is referenced in all other Acceptable Solutions for NZBC clause G13.

The proposal also amends Acceptable Solution G13/AS3 to improve the referencing of AS/NZS 3500:2018 Part 2 – *Sanitary Plumbing and drainage*

Link to appendix

## ITEM 4 – EDITORIAL: Amend G13.2, G13/AS1 and G13/AS2 to correct cross referencing and spelling errors

Link to appendix

# Transitions

**EFFECTIVE DATE:** 25 June 2020

It is proposed that the amendments to the Acceptable Solutions and Verification Methods will be published on, and have an effective date of, 25 June 2020.

**Transitional arrangements:** four months

It is also proposed that the existing Acceptable Solutions and Verification Methods will remain in force, as if not amended, until 25 October 2020 (the proposed cessation date), a period of four months.

| | **Before 25 June 2020** (the proposed effective date) | **From 25 June 2020** (effective date) **to 25 October 2020** (cessation date) |
|---|---|---|
| Existing Acceptable Solutions and Verification Methods, | If used, will be treated as complying with the Building Code | If used, will be treated as complying with the Building Code |
| Amended or new Acceptable Solutions and Verification Methods | Not yet published | If used, will be treated as complying with the Building Code |

## Questions:

Are the proposed timeframes reasonable? (yes or no - why?)

# Appendix

The following content changes are proposed to the selected Acceptable Solutions and Verification Methods. To make the changes easier to see, new text has been highlighted in blue, and existing text that is being removed or modified has been highlighted in red. Should you require any clarification please contact buildingfeedback@mbie.govt.nz.

# C1 – C6 Protection from Fire

## MBIE propose to amend C/VM2

1. **Cladding requirements:** Amend fire testing requirements for cladding systems, to reference large scale international test standards and close existing gaps between C/VM2 and C/AS2
2. **Horizontal fire spread:** Amend the horizontal fire spread requirements in design scenario HS
3. **Editorial:** Amend text is C/VM2 to include text from the document "Commentary for Building Code Clauses C1-C6 and Verification Method C/VM2**".**

## C/VM2 – Item 1 – Cladding requirements: Amend fire testing requirements for cladding systems to reference large scale international test standards and close existing gaps between C/VM2 and C/AS2

Significant high-rise fire events globally have increased the fire engineering community's understanding of how fire spreads externally and within modern facade construction. This has highlighted the need for MBIE to reconsider fire testing protocols for cladding systems. The first step of this review was the release of the MBIE guidance "Fire performance of external wall cladding systems" in February 2019. The next step includes this proposal, which will amend C/VM2 to incorporate the large scale test methods. This proposal also contains further amendments to C/VM2, to better align its cladding requirements with those of C/AS2.

Fire testing protocols used for Building Code compliance in New Zealand have previously been based on either bench scale testing of individual materials or the larger scale American NFPA 285 facade test. Bench scale fire tests have typically treated fire spread over an external wall as a surface flame spread phenomenon (similar to interior linings). External wall cladding systems are complex and can include a multitude of combustible components. Consequently, the entire system performance must be considered. Small scale testing is unable to determine how each individual component contributes to the overall system performance to limit fire spread. Large scale fire tests are a way of assessing how an external wall cladding system performs when exposed to flames and not only that of the outermost cladding material.

Continuous vertical channels and cavities within external wall cladding systems are also known to promote upward vertical fire spread. Fire researchers have noted that when flames are confined within a vertical cavity or channel they elongate, leading to flame extension of up to five to ten times the expected unconfined flame lengths. This is true even in cavities without additional combustible materials present, but is made worse by the presence of combustible materials. This flame extension effect can support rapid, potentially unseen, fire spread within an external wall cladding system and must be limited.

NZBC clauses C3.5 and C3.7 outline the applicable performance criteria that must be met for cladding materials. Clause C3.5 is intended to limit vertical fire spread on a building, and clause C3.7 is used to determine the ignitability of the cladding material and proximity to property boundaries. These are two separate fire problems. While ignitability may be correlated to flame spread, for each problem the external cladding materials are subject to different flame sources and intensities. Clause C3.5 is primarily concerned with the fire risks of the cladding materials as an emitter (ie. the material's contribution to flame spread and increasing heat fluxes at higher levels). Clause C3.7 is concerned with fire risks of the materials as a receiver (ie. Limiting the material's likelihood to ignite from adjacent buildings).

The proposed amendment includes separation of the requirements of component testing and assembly testing into two parts, to differentiate between the requirements for the two separate fire problems addressed by clauses C3.5 and C3.7. First, the behaviour of individual materials and ignitability of individual materials is assessed based on the results of small scale component testing (as required by the C/VM2 design scenario HS). Second, the behaviour of the external wall cladding system as an assembly is evaluated based on the results of large-scale fire tests (as required by the C/VM2 design scenario VS).

When considering large-scale fire tests developed internationally, it is important to recognise that not all tests apply equal severity of fire exposure to the cladding material. Thus, when these tests are adopted into regulations, consideration must be given to how large-scale fire tests conform with other assumptions and apply to certain types of materials. When other countries adopt certain test methods, they may also include restrictions on the construction and materials to which they apply.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 References** | | |
| **Standards New Zealand**<br>AS/NZS 3837: 1998<br>Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter<br>*Amend:* 1<br>4.6, Tables 4.1, 4.2 | **Standards New Zealand**<br>AS/NZS 3837: 1998<br>Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter<br>*Amend:* 1<br>Table 4.1 | The list of locations where this standard is quoted has been amended to reflect other changes proposed for this document. |
| **Standards Australia** | **Standards Australia**<br>AS 5113: 2016 Classification of external walls of buildings based on reaction-to-fire performance<br>Amend 1<br><br>Where quoted: 4.6 | This standard is proposed for reference as an option for compliance with external wall cladding requirements. It was previously referenced only in in the guidance "Fire performance of external wall cladding systems" released in 2019. |
| **British Standards Institution** | **British Standards Institution**<br>BS 8414- Fire performance of external cladding systems<br>Part 1: 2015+A1: 2017 Test method for non-loadbearing external cladding systems applied to the masonry face of a building<br>Where quoted: 4.6<br>Part 2: 2015+A1: 2017 Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame<br><br>Where quoted: 4.6 | This standard is proposed for referenced as an option for compliance with external wall cladding requirements. It was previously referenced only in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| | BS EN 13501- Fire classification of construction products and building elements<br>Part 1: 2018 Classification using test data from reaction to fire tests<br>Where quoted: Definitions | This standard is proposed for reference in the definition of non-combustible. It was previously referenced only in the guidance document "Fire performance of external wall cladding systems" released in 2019. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **International Standards Organisation**<br>ISO 5660:- Reaction-to-fire tests<br>Part 1: 2002 Heat release, smoke production and mass loss rate<br><br>4.6, 4.7, A1.1, A1.2, A1.3, A1.7<br>Tables 4.1, 4.2 | **International Standards Organisation**<br>ISO 5660:- Reaction-to-fire tests<br>Part 1: 2002 Heat release, smoke production and mass loss rate<br><br>4.7, A1.1, A1.2, A1.3, A1.7<br>Table 4.1 | The cross references for this standard are proposed for amendment to reflect the correct locations in the document. |
| **International Standards Organisation**<br>ISO 13785:- Reaction-to-fire tests for facades<br>Part: 2002 Intermediate-scale test | **International Standards Organisation**<br>Delete | The reference to this standard is proposed to be removed as it is no longer cited within the document. The citation of this standard in Paragraph 4.6 was removed in C/VM2 Amendment 4 on 1 July 2014. |
| **National Fire Protection Association**<br>NFPA 285: 1998 Standard method of test for the evaluation of flammability characteristics of exterior non-loadbearing wall assemblies containing components using the intermediate scale, multi-storey test apparatus | **National Fire Protection Association**<br>NFPA 285: 2019 Standard fire test method for evaluation of fire propagation characteristics of exterior wall assemblies containing combustible components | The reference to this standard is proposed for amendment to reflect the most recent version and title of the standard. |
| **BRANZ Ltd**<br>BRANZ Study Report No. 137: 2005 Development of the Vertical Channel Test Method for Regulatory Control of Combustible Exterior Cladding Systems, Whiting, P. N. | **BRANZ Ltd**<br>Delete | The reference to this document is proposed to be removed as it is not referenced within the document. |
| | **BRE Global**<br>BR 135: 2013 Fire performance of external thermal insulation for walls of multistorey buildings Third Edition | This document is proposed for reference as an option for compliance with external wall cladding requirements. It was previously referenced only in the guidance document "Fire performance of external wall cladding systems" released in 2019. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 Definitions** | | |
| | **Cavity barriers**<br>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. | The definition is proposed to be included as the defined term is used within the new proposed requirements for external wall cladding systems. |
| | **Non-combustible**<br>Material either—<br>a) composed entirely of glass, concrete, steel, brick/block, ceramic tile, or aluminium; or<br>b) classified as non-combustible when tested to AS 1530.1; or<br>c) classified as A1 in accordance with BS EN 13501-1. | The definition is proposed to be included to determine the combustibility of materials. The use of this term and the BS EN 13501-1 test method was previously referenced in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| | **Limited combustible**<br>A material that does not comply with the requirements for a *non-combustible* material and is classified as A2 when tested to BS EN 13501-1. | This is a new definition proposed to be included that is based on the European classification of materials. A classification of A2 would general capture materials that contain minor amounts of combustible materials but are unlikely to significantly contribute to fire spread. The use of the term was previously referenced in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| **C/VM2 Paragraph 4.5 Design scenario (HS): Horizontal fire spread** | | |
| **Cladding**<br>To demonstrate that NZBC C3.7 is achieved, it is expected that relevant *fire* test results for the selected cladding system will be provided. Engineers may also choose to comply with Paragraph 5.8 of the relevant Acceptable | **External wall materials**<br>To demonstrate that NZBC C3.7 is achieved, where *external walls* are located less than 1.0 m from a *relevant boundary*, all substantive components in the *external wall* cladding system shall be: | The requirement for testing of external wall materials to achieve compliance with C3.7 is proposed for amendment to reflect the requirements from C/AS2. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| Solutions C/AS2 to C/AS6 or with Table 4.1 to satisfy the performance criteria of this clause. | a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) achieve a Type A classification from Table 4.1. | |
| **Table 4.1 Acceptable heat release rates for external wall cladding systems for control of horizontal fire spread (Note 1)**<br><br>[Refer to existing table to be removed on the following pages] | **Table 4.1 Classification of materials in external wall cladding systems**<br><br>[Refer to proposed new table on the following pages] | Table 4.1 is proposed for amendment to reflect the external wall material testing requirements in C/AS2 and the guidance document "Fire performance of external wall cladding systems" released in 2019. |

## Current C/VM2 Table 4.1 Acceptable heat release rates for external wall cladding systems for control of horizontal fire spread (Note 1) [To be removed]

| **Table 4.1** | **Acceptable heat release rates for external wall cladding systems for control of horizontal fire spread (Note 1)** | | |
|---|---|---|---|
| **Building height** | | **Distance to relevant boundary (all buildings)** | |
| | | **< 1.0 m (note 2)** | **1.0 m or more (note 3)** |
| < 7.0 m | | A | – |
| ≥ 7.0 m and < 25 m | | A | B (note 5) |
| ≥ 25 m | | A | B |
| Key:<br>The *external wall* cladding system shall have a peak *heat release rate* and total heat released not greater than given below for the applicable performance level. | | | |
| | Peak *heat release rate* ($kW/m^2$)<br>(Note 4) | Total heat released ($MJ/m^2$)<br>(Note 4) | |
| A | 100 | 25 | (The smaller the *heat release* value the more stringent the requirement) |
| B | 150 | 50 | |
| – | No requirement | No requirement | |

**Notes:**

1. Check *design scenario* VS for possible greater requirements.

2. The maximum permitted radiation flux criteria specified in the NZBC assume claddings within 1.0 m of the relevant boundary will not ignite.

3. As an alternative to specifying a cladding meeting the 'B' performance level, engineers may calculate the contribution of a combustible cladding to the radiation received at and beyond the relevant boundary to demonstrate the maximum permitted radiation flux criteria specified in the NZBC are not exceeded.

4. Determined by testing to ISO 5660.1 or AS/NZS 3837 at an irradiance of 50 $kW/m^2$ for duration of 15 minutes.

5. Where the *building* is fully sprinklered in accordance with a recognised Standard, there is no requirement.

## Proposed C/VM2 Table 4.1 Classification of materials in external wall cladding systems

| Table 4.1 | Classification of materials in external wall cladding systems | |
|---|---|---|
| **Cladding material type[1,2,3,4]** | **Peak heat release rate (kW/m$^2$)** | **Total heat released (MJ/m$^2$)** |
| **Type A** | ≤ 100 | ≤ 25 |
| **Type B** | ≤ 150 | ≤ 50 |

**Notes:**

1. Materials in *external wall* cladding systems shall be classified as Type A or Type B based on the peak heat release rate and total heat released 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.

2. In addition to meeting the general requirements of ISO 5660 Part 1 or 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

a) a test duration of 15 minutes, and

b) the total heat release measured from start of the test, and

c) sample orientation horizontal, and

d) ignition initiated by the external spark igniter.

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 in Note 1.

4. Cladding materials 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 Note 2 without the metal facing present.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 Paragraph 4.6 Design scenario (VS): External vertical fire spread** | | |
| Comment:<br>1. `This scenario is not concerned with horizontal building-to-building fire spread across a relevant boundary, as this is addressed in the design scenario: HS (see Paragraph 4.5).<br>2. Multi-level buildings include:<br>a) Buildings with more than one full floor<br>b) Buildings that have more than one intermediate floor and the escape height of the uppermost intermediate floor is greater than 10 m, e.g. a multi-storey office with an atrium | Comment:<br>This scenario is not concerned with horizontal building-to-building fire spread across a relevant boundary, as this is addressed in the design scenario: HS (see Paragraph 4.5). | The comment box provides a description of multi-level buildings. However, this description does not form a normative requirement and does not align with typical usage of the term “multi-level” and the definition of “intermediate floor”, and its removal is therefore proposed. |
| There are three considerations in this scenario:<br>Part A: External vertical fire spread over the façade materials, and<br>…<br>**Comment:**<br>Part A addresses concerns regarding the contribution of combustible claddings to vertical *fire* spread. Parts B and C look at the use of aprons, spandrels, *fire* rated lower roofs, *fire* rated external walls, or sprinklers to prevent external *fire* spread between openings at different levels in the *building*. In the case of Part C, vertical *fire* spread via an unprotected lower roof to | There are three considerations in this scenario:<br>Part A: External vertical fire spread over the façade materials and within the *external wall* cladding system, and<br>…<br>**Comment:**<br>Part A addresses concerns regarding the contribution of the *external wall* cladding system to vertical *fire* spread. Parts B and C look at the use of aprons, spandrels, *fire* rated lower roofs, *fire* rated external walls, or sprinklers to prevent external *fire* spread between openings at different levels in the *building*. In the case of Part C, vertical *fire* spread via an unprotected lower roof to an adjacent | The Scenario description for Part A treats fire spread over the external wall as a surface flame spread phenomenon (similar to interior linings). However, it is apparent that in many cases it is the entire system performance that must be considered.<br>The description of the scenario is proposed for amendment to reflect fire spread not just on a cladding systems but within the external wall as well. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| an adjacent *building* also needs to be considered. | *building* also needs to be considered. | |
| ***Part A: External vertical fire spread over facade materials***<br>This part applies to all multi-level *buildings* with a *building height* of more than 10 m where upper floors contain sleeping uses or *other property*. | ***Part A: External vertical fire spread over facade materials***<br>This part applies to all multi-level *buildings* with a *building height* of more than 10 m. | The description of Part A of this scenario is proposed for amendment to reflect the requirements in C/AS2 which address all multi-level building in order to achieve compliance with the Building Code. |
| This can be achieved by:<br>a) Limiting the maximum *HRR* from a cladding material when exposed to the design event to no more than 100 kW/m², or<br>b) Limiting the extent of the vertical flame spread distance (on the façade) to no more than 3.5 m above the *fire source*. This accepts that *fire* spread via the façade materials may occur to the floor immediately above, but not two floors above. | This can be achieved by limiting the extent of the vertical flame spread distance of the entire *external wall* assembly above the *fire source*. | The Scenario description for Part A treats fire spread over the external wall as a surface flame spread phenomenon (similar to interior linings). However, it is apparent that in many cases it is the entire system performance that must be considered and there this text is proposed for amendment. |
| **Method**<br>For Part A, either:<br>a) Comply with Table 4.2 in C/VM2, or<br>b) Use non-combustible materials, or<br>c) Use large or medium scale façade type tests to determine the extent of vertical flame test is not more than 3.5 m above the *fire* source.<br>Comment:<br>Validated flame spread models could be used for some materials.<br><br>The requirements given in the relevant Acceptable Solution Paragraph 5.8 for *fire* | **Method**<br>For *buildings* containing sleeping care or sleeping detention uses, where *external walls* are located more than 1.0 m from a *relevant boundary*, substantive components in the *external wall* cladding system shall be:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) achieve a Type A or Type B classification from Table 4.1.<br><br>In addition to the above requirement, for all *buildings* where this scenario applies, the entire *external wall* | The requirements to satisfy Part A are proposed for amendment to align with C/AS2 and the guidance document "Fire performance of external wall cladding systems" released in 2019. This provides a range of suitable large scale fire tests to satisfy the requirements.<br>Reference to flame spread models in the comment are proposed to be removed as there are limited (or none) models currently available that could be used in this manner.<br>The requirements in C/VM2 are more stringent than those found in C/AS2 and this reflects that the scope of buildings in C/VM2 may be |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| properties of external claddings are acceptable means of demonstrating compliance with Part A above for *buildings* with an *importance level* not higher than 3. | assembly (including the cladding system, *external wall* framing and any insulation) shall be:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) classified in accordance with AS 5113 and achieve a EW classification; or<br>c) tested in accordance with BS 8414-1 and satisfy the acceptance criteria in BR 135; or<br>d) tested in accordance with BS 8414-2 and satisfy the acceptance criteria in BR 135; or<br>e) tested in accordance with NFPA 285 and pass, and have all substantive components in the *external wall* cladding system:<br>i) comprised of *non-combustible* or *limited combustible* materials; or<br>ii) achieve a Type A classification from Table 4.1.<br>The spread of fire through cavities in an *external wall* shall be avoided by providing *cavity barriers* at each floor level. *Cavity barriers* shall comply with the requirements in Paragraphs 4.15.3 to 4.15.5 of Acceptable Solution C/AS2.<br><br>The requirements given in Acceptable Solution C/AS2 Paragraphs 5.8.3 to 5.8.5 are an acceptable means of demonstrating compliance with Part A above for *buildings* with an *importance level* not | broader than those in C/AS2. However, direct compliance with C/AS2 is referenced as an option for buildings of lower importance levels. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | higher than 3 and with a *building height* less than 25 m. | |
| ***Part B: External vertical fire spread via openings and unprotected areas***<br>This part applies to other multi-level buildings with a building height greater than 10 m where people sleep, have external exitways or exitways with an external wall, or that are defined as other property.<br>The design fire exposure is a fire plume projecting from openings or unprotected areas in the external wall, with characteristics determined from the design fire as described in Part 2 for the applicable occupancy. | ***Part B: External vertical fire spread via openings and unprotected areas***<br>This part applies to multi-level buildings with a building height greater than 10 m where people sleep, have external exitways or exitways with an external wall, or that are defined as other property.<br>The design fire exposure is a fire plume projecting from openings or unprotected areas in the external wall, with characteristics determined from the design fire as described in Part 2 of this Verification Method for the applicable occupancy. | The text is proposed to be amended to clarify the application for Part B. |
| **Method**<br>For Part B, either:<br>a) Follow the requirements of Acceptable Solutions C/AS2 to C/AS6 and provide construction features such as aprons and/or spandrels, or …<br>c) …as described in Part 2 for the applicable geometry. | **Method**<br>For Part B, either:<br>a) Follow the requirements of Acceptable Solution C/AS2 and provide construction features such as aprons and/or spandrels, or …<br>c) …as described in Part 2 of this Verification Method for the applicable geometry. | The text reference is proposed to be amended to reflect the current Acceptable Solution C/AS2 and clarify the cross reference in c). |
| ***Part C: Lower Roof Exposure***<br>…adjacent *building*…<br>…adjacent *building*…<br>…adjacent *building*…<br>…other property… | ***Part C: Lower Roof Exposure***<br>…*adjacent building*…<br>…*adjacent building*…<br>…*adjacent building*…<br>…*other property*… | *Adjacent building* and *other property* are defined terms and are proposed to appear in italics. |
| **Method**<br>For Part C follow the requirements of Part 5: Control of external fire spread of the relevant Acceptable Solutions (C/AS2 to C/AS6) and use: … | **Method**<br>For Part C follow the requirements of Part 5: Control of external fire spread of Acceptable Solution C/AS2 and use: … | The text reference is proposed to be amended to reflect the current Acceptable Solution C/AS2. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Table 4.2 Acceptable heat release rates for external wall cladding systems for control of vertical fire spread (Note 1)**<br><br>[Refer to the current table below] | Delete Table 4.2 | With the proposed changes to cladding requirements, Table 4.2 no longer references the correct fire performance requirements for external wall cladding systems and is proposed to be removed from the document. |

## Current C/VM2 Table 4.2 Acceptable heat release rates for external wall cladding systems for control of vertical fire spread (Note 1) [To be removed]

**Table 4.2** Acceptable heat release rates for external wall cladding systems for control of vertical fire spread (Note 1)

| Building height | Sleeping uses or *other property* on an upper floor | No sleeping uses nor *other property* on an upper floor |
|---|---|---|
| ≤ 10 m | – | – |
| > 10 m and < 25 m | A (sleeping care or detention)<br>B (other sleeping)<br>B (*other property*) – Note 2 | – |
| ≥ 25 m | A | – |

Key:

The *external wall* cladding system shall have a peak *heat release rate* and total heat released not greater than given below for the applicable performance level

| | Peak *heat release rate* ($kW/m^2$) (Note 3) | Total heat released ($MJ/m^2$) (Note 3) | |
|---|---|---|---|
| A | 100 | 25 | (The smaller the *heat release* value the more stringent the requirement) |
| B | 150 | 50 | |
| – | No requirement | No requirement | |

**Notes:**

1. Check *design scenario* HS for possible greater requirements.

2. Where the *building* is fully sprinklered in accordance with a recognised Standard, there is no requirement.

3. Determined by testing to ISO 5660.1 or AS/NZS 3837 at an irradiance of 50 $kW/m^2$ for duration of 15 minutes.

## C/VM2 – Item 2 – Amend the horizontal fire spread requirements to align C/VM2 with C/AS2

C/VM2 Design scenario 'Horizontal Fire Spread' (HS) is intended to limit fire spread from the subject building to neighbouring buildings. Acceptable Solution C/AS2 contains similar requirements. However, the C/VM2 requirements permit designers to provide an automatic sprinkler system supplied by two independent water supplies for firecells not containing a storage occupancy as a means to comply. For buildings less than 1 m from a boundary, the received radiation from a fire may not meet the values specified by the Building Code clause C3.6 and reliance on a sprinkler system may not adequately consider the reliability and redundancy of the systems to control fire spread. An amendment is proposed to C/VM2 design scenario HS to maintain the same performance setting as C/AS2 and remove the inconsistency between the documents. Further amendments are required for design scenario HS to clarify the Verification Method.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 References** | | |
| **Standards New Zealand**<br>NZS 4541: 2013 Automatic fire sprinkler systems<br><br>Where quoted: Definitions | **Standards New Zealand**<br>NZS 4541: 2013 Automatic fire sprinkler systems<br><br>Where quoted: Definitions, 4.5 | The NZS 4541 standard is proposed for reference within Design scenario HS as a means to provide dual water supplies to a sprinkler system in the building. |
| **C/VM2 Paragraph 4.5 Design scenario (HS): Horizontal fire spread** | | |
| **Comment:**<br>The performances specified in NZBC C3.6 are deemed to be achieved in *buildings* with an automatic sprinkler system with two independent water supplies, one of which is not dependent on town mains and not used for storage above 3.0 m.<br>The performance requirements of C3.6 are also to be applied to limit the radiation at the *notional boundary* to sleeping occupancies and *exitways* in *buildings* under the same *ownership*. This partially contributes to the achievement of the functional requirement C4.2. | | This Comment box is proposed to be amended to make the requirements normative and align with the requirements for protection with dual water supplies in C/AS2. The text is also proposed to include reference to defined terms and to replace reference to "C/AS2 to C/AS6" with "C/AS2" which now contains requirements for all risk groups. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Scenario description**<br>A fully developed *fire* in a building exposes the *external walls* of a neighbouring *building* (*other property*) or *firecell* (sleeping occupancy, *exitway* or *other property*).<br>This scenario addresses a *fire* in a *building* that leads to high levels of radiation heat exposure across a *relevant boundary*, potentially:<br>1) Igniting the *external walls* of a neighbouring *building*, or<br>2) Leading to *fire* spread to *other property*, sleeping occupancies and *exitways*.<br>An exception to 2) above is if a sprinklered unit-titled *building* is subdivided, the protection between any title and areas in common need not be *fire* rated for the protection of *other property* unless required for separation of *escape routes*, to separate sleeping occupancies, or by the FO scenario.<br>In a *firecell* not containing a storage occupancy or a storage occupancy with a capability to store to more than 3.0 m, and which is protected with an automatic sprinkler system supplied by two independent water supplies, one of which is not dependent on town mains, there are no restrictions on the amount of *unprotected area* and the fire engineer does not need to assess the external fire spread to the boundary.<br>*Unprotected area* shall include both unrated *external wall construction* as well as any unrated window/door | **Scenario description**<br>A fully developed *fire* in a *building* exposes the *external walls* of a neighbouring *building* (*other property*) or *firecell* (sleeping occupancy, *exitway* or *other property*).<br>This scenario addresses a *fire* in a *building* that leads to high levels of radiation heat exposure across a *relevant boundary*, potentially:<br>1) Igniting the *external walls* of a neighbouring *building*, or<br>2) Leading to *fire* spread to *other property*, sleeping occupancies and *exitways*.<br>The performance requirements of C3.6 are also to be applied to limit the radiation at the *notional boundary* to sleeping occupancies and *exitways* in *buildings* under the same *ownership*. This partially contributes to the achievement of the functional requirements C4.2.<br>An exception to 2) above is if a sprinklered unit-titled *building* is subdivided, the protection between any title and areas in common need not be *fire* rated for the protection of *other property* unless required for separation of *escape routes*, to separate sleeping occupancies, or by the FO scenario.<br>*Unprotected area* shall include both unrated *external wall construction* as well as any unrated window/door | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| assemblies and other openings. Areas of the *external wall* that are not designated as *unprotected area* shall have a *fire resistance rating* (meeting the integrity criteria sufficient to resist the full *burnout design fire* described in Paragraph 2.4 and with *insulation* sufficient to meet NZBC C3.7.<br><br>Furthermore, the structural system supporting those parts of the *external wall* that are not permitted to be unprotected must also provide *structural adequacy* sufficient to keep the *external wall* in place for the full duration of the *fire*.<br>*Unprotected area* is not permitted within 1.0 m of a *relevant boundary*, except for a combination of small *unprotected area* and/or *fire resisting glazing* as described in Acceptable Solutions C/AS2 to C/AS6 Paragraph 5.4 or in the commentary document for this Verification Method. | assemblies and other openings. Areas of the *external wall* that are not designated as *unprotected area* shall have a *fire resistance rating* (meeting the integrity criteria sufficient to resist the full *burnout design fire* described in Paragraph 2.4 and with *insulation* sufficient to meet NZBC C3.7.<br><br>Furthermore, the structural system supporting those parts of the *external wall* that are not permitted to be unprotected must also provide *structural adequacy* sufficient to keep the *external wall* in place for the full duration of the *fire*.<br>*Unprotected area* is not permitted within 1.0 m of a *relevant boundary*, except for a combination of small *unprotected area* and/or *fire resisting glazing* as described in Acceptable Solution C/AS2 Paragraph 5.4 or in Appendix C for this Verification Method.<br>There are no restrictions on the amount of *unprotected area* and the performances specified in NZBC C3.6 are deemed to be achieved if:<br>a) the *external wall* is more than 1.0 m of the *relevant boundary*; and<br>b) the *firecell* does not contain a storage occupancy with a capability to store to more than 3.0 m; and<br>c) the *building* is provided with a sprinkler system complying with NZS 4541, as amended by Appendix B of C/AS2, with a | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | Class A or Class B2 water supply. | |
| **Design fire**<br>The *design fire* for this scenario comprises an assumed emitted radiation flux from *unprotected areas* in *external walls* of the *fire source building* (assuming no intervention). This shall be taken as:<br>a) 83 kW/m² for FLED ≤ 400 MJ/m²<br>b) 103 kW/m² for FLED between 400 and 800 MJ/m², and<br>c) 144 kW/m² for FLED greater than 800 MJ/m², and<br>d) 58 kW/m² for FLED for sprinklered *firecells* not containing a storage occupancy or a storage occupancy with a capability to store to more than 3.0 m.<br><br>Emissivity of *fire* gases shall be taken as 1.0. | **Design fire**<br>The *design fire* for this scenario comprises an assumed emitted radiation flux from *unprotected areas* in *external walls* of the *fire source building* (assuming no intervention). This shall be taken as:<br>a) for unsprinklered *firecells*:<br>i) 83 kW/m² for *FLED* ≤ 400 MJ/m²,<br>ii) 103 kW/m² for *FLED* between 400 and 800 MJ/m², and<br>iii) 144 kW/m² for *FLED* greater than 800 MJ/m²; and<br>b) for sprinklered *firecells*:<br>i) 58 kW/m² for *FLED* ≤ 400 MJ/m²,<br>ii) 72 kW/m² for *FLED* between 400 and 800 MJ/m², and<br>iii) 101 kW/m² for *FLED* greater than 800 MJ/m².<br>Emissivity of *fire* gases shall be taken as 1.0. | The radiant heat fluxes specified did not contain values for sprinklered buildings with higher FLEDs. Emitted radiant heat fluxes for sprinklered occupancies were previously contained within the Protection from Fire clarifications. The proposal is to amend the text and include the requirements for sprinklered firecells. |
| **Method 1 Calculations** | **Method A Calculations** | Because Appendix C refers to methods 1, 2, 3, and 4, Method 1 in the main body is to proposed to be replaced with the numbering "Method A" to ensure the requirements can be clearly distinguished between the main document and appendix. |
| f) the emitted radiation flux for sprinklered *firecells* | f) the emitted radiation flux for sprinklered *firecells* for the appropriate *FLED* | This text is proposed to be amended to reflect that radiation calculations contain multiple options for *FLED*. |
| The *unprotected area calculated*… | The *unprotected area* calculated… | Calculated is not a defined term and is proposed to not require italics. |

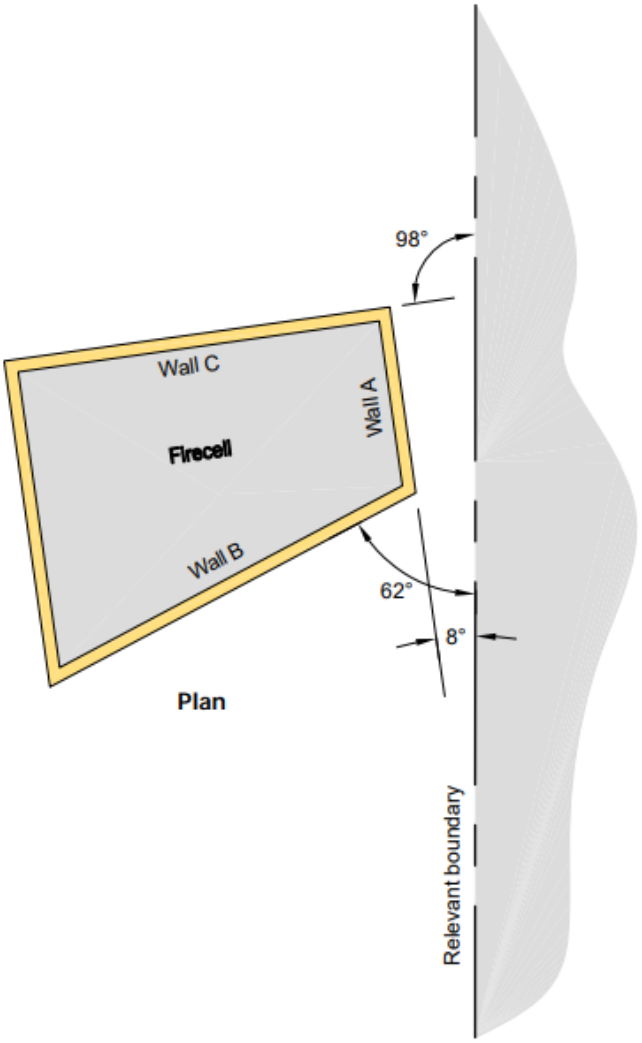
| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Method 2 Tabulated values**<br>Use the tabulated values of the maximum percentage of permitted *unprotected area* directly from the Acceptable Solutions C/AS2 to C/AS6 as appropriate for the *firecell*, or the tables as provided in the commentary for this Verification Method.<br>The tables in the commentary document along with additional tables for *fire resisting glazing* and return and/or wing walls have been produced in accordance with this Verification Method. These tables can be used directly for unsprinklered *firecells* as long as *external walls* are parallel to, or angled at no more than, 10° to the *relevant boundary* and are no closer than 1.0 m to the *relevant boundary*.<br>For *external walls* at greater angles to the *relevant boundary*, appropriate calculations shall be undertaken to demonstrate that the performance criteria are achieved and minimum dimensions shall be specified for return and/or wing walls as necessary or use tables as provided in the commentary document.<br>In all *firecells* protected with an automatic sprinkler system, the maximum permitted *unprotected area* obtained from tabulated values (in an Acceptable Solution or commentary) for an unsprinklered space can be doubled. | **Method B Tabulated values**<br>Use the tabulated values of the maximum percentage of permitted *unprotected area* directly from Acceptable Solution C/AS2 as appropriate for the *firecell*, or the tables as provided in Appendix C for this Verification Method.<br>The tables in Appendix C can be used directly for unsprinklered *firecells* as long as *external walls* are parallel to, or angled at no more than, 10° to the *relevant boundary* and are no closer than 1.0 m to the *relevant boundary*.<br>For *external walls* at greater angles to the *relevant boundary*, appropriate calculations shall be undertaken to demonstrate that the performance criteria are achieved and minimum dimensions shall be specified for return and/or wing walls as necessary or use tables as provided in Appendix C.<br>In all *firecells* protected with an automatic sprinkler system, the maximum permitted *unprotected area* obtained from tabulated values in Appendix C for an unsprinklered space can be doubled. | The text is proposed to be amended to reference the relevant tables now found in C/AS2 and Appendix C of C/VM2. Because Appendix C refers to methods 1,2,3 and 4, Method 2 in the main body is proposed to be replaced with the numbering “B” to ensure the requirements can be clearly distinguished between the main document and appendix. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 Appendices** | | |
| | **Appendix C (normative) Methodology for design scenario HS: Horizontal fire spread (Tabular Data)**<br><br>[Refer to proposed text for Appendix C] | The tabular data method was previously found in Appendix A of the document "Commentary for Building Code Clauses C1-C6 and Verification Method C/VM2". It is proposed to move these tables into Appendix C of C/VM2 to ensure that the compliance pathway is clear. The text from the commentary has been re-written and reformatted for inclusion as normative requirements in the document. |

| Proposed text |
|---|
| **C/VM2 Appendix C1.1** |
| **C1.1 Horizontal fire spread from external walls**<br>**C1.1.1** This Appendix contains tabular data that can be used to satisfy Method B of *design scenario* HS: Horizontal fire spread. The requirements in this Appendix depends on the intersection angle of the *external wall* and the *relevant boundary*.<br>Intersection Angle<br>**C1.1.2** The intersection angle is the angle produced between two horizontal lines, one being the line projected along the exterior face of a space bounded by *separating elements*, and the other being the *relevant boundary* (see Figure C.1). Where *external walls* are parallel to one another, or to a *relevant boundary*, the intersection angle is zero degrees.<br>**C1.1.3** The following methods shall be applied depending on the intersection angle.<br>For angles of ≤ 10°, apply Methods 1 or 2.<br>b) For angles > 10° to < 80° or for *buildings* of irregular shape, apply Method 3.<br>c) For angles ≥ 80° to < 135°, apply Method 4.<br>For angles of 135° or greater there are no requirements and an *unprotected area* of 100% is permitted for the *external wall*.<br>Notional boundary firecells on the same property<br>**C1.1.4** For *buildings* on the same property, the words *relevant boundary* shall be interpreted as *notional boundary* for the application of this Appendix. |

## Proposed C/VM2 Figure C.1 Measuring intersection angle in external walls adjacent to a relevant boundary

**Figure C.1** **Measuring intersection angle in external walls adjacent to a relevant boundary**
Paragraph C1.1.2




This example illustrates the situation where each of the methods 1, 2, 3 and 4 are used to restrict the size and/or location of *unprotected areas* in *external walls* close to the *relevant boundary* with *other property*.

**Wall A: Intersection angle of 10° or less** (shown as 8° in above example). If any part of the wall is within 1.0 m of the *relevant boundary* use Method 1. If the wall is 1.0 m or more from the *boundary* use Method 2.

**Wall B: Intersection angle between 10° and 80°** (shown as 62° in above example). Use Method 3 applying the case for *buildings* which are irregular or non-parallel to the *boundary*.

**Wall C: Intersection angle from 80° to 135°** (shown as 98° in above example). Use Method 4 for return walls and wing walls.

**Proposed text**

**C/VM2 Appendix C2.1**

**C2.1 Method 1 – Small openings and fire resisting glazing**

**C2.1.1** The provisions for *external wall construction* are satisfied if:

Small *unprotected areas* with a maximum area of 0.1 $m^2$ (Type A areas) and areas of *fire resisting glazing* (Type B areas) are located to comply with Figure C.2, and

The remainder of the *wall* is *fire* rated equally for exposure to *fire* on both sides.

**C2.1.2** The *fire resisting glazing* shall be rated for integrity and the *FRR* of both the glazing and *external wall* shall be derived from the full *burnout design fire* as described in Paragraph 2.4 of this Verification Method.

Size and spacing of Type A and Type B areas

**C2.1.3** Type A areas shall be no greater than 0.1 $m^2$. Type B areas shall be no greater than permitted by Table C.1 according to the distance from the *relevant boundary*.

**C2.1.4** There is no limitation on the spacing between adjacent Type A and Type B areas which occur in different spaces bounded by *separating elements*. Within a space bounded by *separating elements* the following requirements shall apply:

a) Type A areas shall be no closer, both vertically and horizontally, than 1.5 m to another Type A or to a Type B area.

b) Type B areas shall be no closer to one another, vertically or horizontally, than the dimensions X or Y shown on Figure C.2.

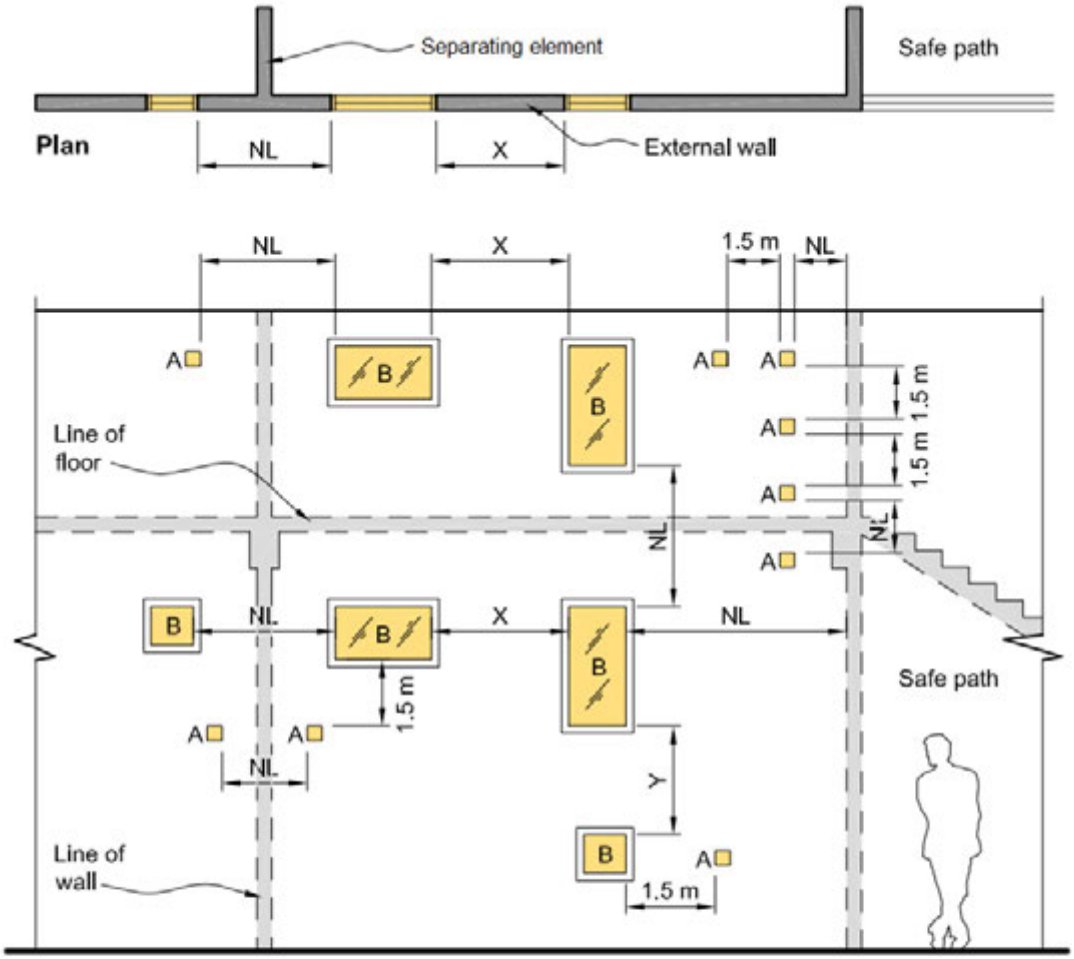
**Comment:**

To determine dimensions X and Y, measure the width and height of both the adjacent Type B areas. The minimum value for X is the greater of the two widths, and for Y the greater of the two heights

c) Where Type B areas are staggered, rather than being aligned vertically or horizontally, the shortest distance, in any direction, between adjacent areas shall be no less than the greater of the X and Y measurements.

## Proposed C/VM2 Figure C.2 Method 1 – Permitted small unprotected areas and fire resisting glazing

**Figure C.2** | **Method 1 – Permitted small unprotected areas and fire resisting glazing**
Paragraph C2.1.4




**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 A1
- 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

## Proposed C/VM2 Table C.1 Permitted areas of fire resisting glazing

| Table C.1 | Permitted areas of fire resisting glazing<br>Paragraph C2.1.3 | | | | |
|---|---|---|---|---|---|
| **Minimum distance to relevant boundary (m)** | **FLED** | | | | |
| | **≤ 400 MJ/m²** | **> 400 to ≤ 800 MJ/m²** | | **> 800 MJ/m²** | |
| | **Unsprinklered[1]** | **Unsprinklered** | **Sprinklered** | **Unsprinklered** | **Sprinklered** |
| 0.0 | 1.0 | 1.0 | 5.0 | 1.0 | 1.0 |
| 0.1 | 1.0 | 1.0 | 6.5 | 1.0 | 1.0 |
| 0.2 | 1.0 | 1.0 | 7.5 | 1.0 | 1.0 |
| 0.3 | 1.0 | 1.0 | 9.0 | 1.0 | 1.0 |
| 0.4 | 1.0 | 1.0 | 10.0 | 1.0 | 1.5 |
| 0.5 | 1.5 | 1.0 | 11.0 | 1.0 | 2.5 |
| 0.6 | 2.0 | 1.0 | 13.0 | 1.0 | 3.5 |
| 0.7 | 3.0 | 1.5 | 14.0 | 1.0 | 5.0 |
| 0.8 | 3.5 | 2.0 | 15.0[3] | 1.0 | 6.5 |
| 0.9 | 5.0 | 3.0 | | 1.5 | 7.5 |
| 1.0 | 6.0 | 3.5 | | 1.5 | 8.5 |
| 1.1 | 7.5 | 4.5 | | 2.0 | 9.5 |
| 1.2 | 8.5 | 5.5 | | 2.5 | 10.0 |
| 1.3 | 10.0 | 7.0 | | 3.0 | 11.0 |
| 1.4 | 12.0 | 8.0 | | 3.5 | 12.0 |
| 1.5 | 13.0 | 8.5 | | 4.0 | 13.0 |
| 1.6 | 14.0 | 9.5 | | 5.0 | 14.0 |
| 1.7 | 15.0[2] | 10.0 | | 5.5 | 15.0[3] |
| 1.8 | | 10.0 | | 6.0 | |
| 1.9 | | 11.0 | | 6.5 | |
| 2.0 | | 12.0 | | 7.0 | |
| 2.1 | | 13.0 | | 7.5 | |
| 2.2 | | 14.0 | | 8.0 | |
| 2.3 | | 15.0[3] | | 8.5 | |

**Notes:**

1. For sprinklered *firecells* with a *FLED* ≤ 400 MJ/m², the area of *fire resisting glazing* is unlimited and may be any distance from the *relevant boundary*.

2. For *firecells* with a *FLED* ≤ 400 MJ/m², there is no limit on the permitted area of fire resisting glazing at distances greater than 1.7 m from the relevant boundary.

3. For *firecells* with a *FLED* > 400 MJ/m², the maximum permitted area of *fire resisting glazing* is 15 m².

## Proposed C/VM2 Table C.1 Permitted areas of fire resisting glazing – Continued

| Table C.1 | Permitted areas of fire resisting glazing<br>Paragraph C2.1.3 | | | | |
|---|---|---|---|---|---|
| **Minimum distance to relevant boundary (m)** | **FLED** | | | | |
| | **≤ 400 MJ/m²** | **> 400 to ≤ 800 MJ/m²** | | **> 800 MJ/m²** | |
| | **Unsprinklered[1]** | **Unsprinklered** | **Sprinklered** | **Unsprinklered** | **Sprinklered** |
| 2.4 | | | | 9.0 | |
| 2.5 | | | | 9.5 | |
| 2.6 | | | | 10.0 | |
| 2.7 | | | | 11.0 | |
| 3.0 | | | | 12.0 | |
| 3.1 | | | | 13.0 | |
| 3.2 | | | | 14.0 | |
| 3.4 | | | | 15.0[3] | |

**Notes:**

1. For sprinklered *firecells* with a *FLED* ≤ 400 MJ/m², the area of *fire resisting glazing* is unlimited and may be any distance from the *relevant boundary*.

2. For *firecells* with a *FLED* ≤ 400 MJ/m², there is no limit on the permitted area of fire resisting glazing at distances greater than 1.7 m from the relevant boundary.

3. For *firecells* with a *FLED* > 400 MJ/m², the maximum permitted area of *fire resisting glazing* is 15 m².

**Proposed text**

**C/VM2 Appendix C2.2**

**C2.2 Method 2 – Enclosing Rectangles – Parallel Boundary**

**Application**

**C2.2.1** This method shall be applied to *external walls* of *buildings* that are parallel to or angled at no more than 10° to the *relevant boundary*.

**C2.2.2** This method is used to calculate the maximum percentage of *unprotected area* in the *external wall* of each space bounded by *separating elements.* This is based on the dimensions of *unprotected areas*, *FLED*, and the distance from the *external wall* to the *relevant boundary.*

Enclosing Rectangle dimensions

**C2.2.3** The dimensions of the *unprotected areas* in the *external wall* of each space shall be determined by drawing a rectangle enclosing all *unprotected areas* and the protected areas between them (see Figure C.3) and measuring the height and width of the enclosing rectangle.

**C2.2.4** The maximum *unprotected area* for the *external walls* shall be specified in:

a) Table C.2a for an enclosing rectangle height of 1.0 m

b) Table C.2b for an enclosing rectangle height of 2.0 m

c) Table C.2c for an enclosing rectangle height of 3.0 m

d) Table C.2d for an enclosing rectangle height of 4.0 m

e) Table C.2e for an enclosing rectangle height of 6.0 m

f) Table C.2f for an enclosing rectangle height of 8.0 m

For enclosing rectangle heights greater than 8.0 m, radiation from *unprotected areas* in the *external wall* shall be determined using Method A Calculations in accordance with Paragraph 4.5 of the Verification Method.

Tables C.2a to C.2f are split into three parts according to the *FLED* range. The design *FLED* is provided in Table 2.2. The maximum enclosing rectangle width shall be 20 m for *FLED* ≤ 800 MJ/m$^2$ and 30 m for *FLED* > 800 MJ/m$^2$.

**C2.2.5** If Tables C.2a to C.2f do not contain the exact measurements for the enclosure being considered, use the next highest value for rectangle height or rectangle width or next lowest value for distance to the *relevant boundary*.

**C2.2.6** Where the enclosure is sprinklered, increases are permitted in accordance with Paragraph 4.5 of this Verification Method.

Required distance from the relevant boundary

**C2.2.7** Tables C.2a to C.2f can also be used to determine the required distance from the *relevant boundary* where the percentage of *unprotected area* has previously been determined. Select the permitted percentage of *unprotected areas* (under the rectangle width column) and read the minimum permitted distance to the *relevant boundary* from the left hand column of the table.

Additional check of large unprotected openings

**C2.2.8** The enclosing rectangle method assumes that *unprotected areas* are uniformly distributed openings over the total *external wall* of the *firecell*. In most cases, radiant heat flux is more intense from a single large opening than from several small openings with the same total area. As an additional safety check, identify the largest single *unprotected area* and use the height and width of this opening as an enclosing rectangle on its own with 100% *unprotected area*. The minimum permitted distance from the largest single *unprotected area* to the *relevant boundary* shall be no greater than the distance between the *external wall* and the *relevant boundary* used in Paragraphs C2.2.4 to C2.2.7.

## Proposed C/VM2 Figure C.3 Method 2 Enclosing rectangles (unprotected areas)

**Figure C.3** **Method 2 Enclosing rectangles (unprotected areas)**
Paragraph C2.2.4

**Rectangle construction**

Diagram A, B and C demonstrate how, for a given *external wall* of a single *firecell*, dimensions of the enclosing rectangle (indicated by the rectangle diagonals) vary according to the extent and location of *fire* rated *construction*. The essential requirement is for the rectangle to enclose all *unprotected areas*. This means that such things as an isolated window or door or other non-*fire* rated part of the wall can significantly alter the rectangle dimensions and may include part of the *fire rated* wall.

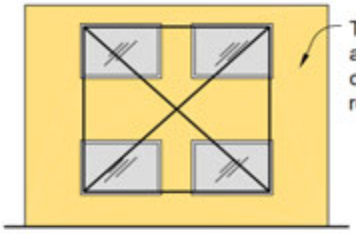



Diagram A

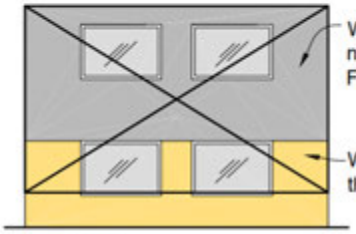



Diagram B

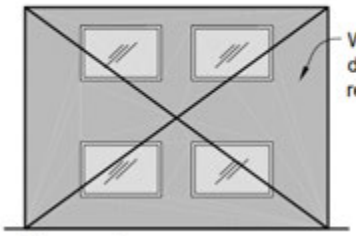



Diagram C

**Legend**

*External wall* with less than the required *FRR* (includes zero *FRR*)

*External wall* with required *FRR*

Openings or windows

Rectangle containing diagonals is the 'enclosing rectangle' for calculations

## Proposed C/VM2 Table C.2 Height of enclosing rectangle

[Refer to the proposed tables on the following pages]

**Table C.2a** **Height of enclosing rectangle 1.0 metres**

Paragraph C2.2.4

| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 100 | 89 | 85 | 82 | 81 | 81 | 80 | 80 | 81 | 71 | 68 | 66 | 66 | 65 | 65 | 64 | 58 | 51 | 49 | 47 | 47 | 47 | 46 | 46 | 46 |
| 1.1 | | 98 | 92 | 89 | 87 | 85 | 84 | 84 | 91 | 79 | 75 | 72 | 70 | 69 | 68 | 67 | 65 | 56 | 53 | 51 | 50 | 49 | 48 | 48 | 48 |
| 1.2 | | 100 | 100 | 96 | 92 | 90 | 88 | 87 | 100 | 87 | 81 | 78 | 74 | 72 | 71 | 70 | 73 | 62 | 58 | 56 | 53 | 52 | 51 | 50 | 50 |
| 1.3 | | | | 100 | 96 | 94 | 92 | 91 | | 95 | 88 | 82 | 78 | 76 | 74 | 73 | 81 | 68 | 63 | 59 | 56 | 54 | 53 | 53 | 52 |
| 1.4 | | | | | 100 | 98 | 96 | 95 | | 100 | 96 | 87 | 81 | 79 | 77 | 77 | 90 | 74 | 68 | 62 | 58 | 57 | 55 | 55 | 55 |
| 1.5 | | | | | | 100 | 100 | 99 | | | 100 | 91 | 85 | 83 | 80 | 80 | 100 | 81 | 74 | 65 | 61 | 59 | 57 | 57 | 57 |
| 1.6 | | | | | | | | 100 | | | | 96 | 89 | 86 | 84 | 83 | | 88 | 80 | 69 | 64 | 62 | 60 | 59 | 59 |
| 1.7 | | | | | | | | | | | | 100 | 93 | 90 | 87 | 86 | | 96 | 96 | 72 | 67 | 64 | 62 | 61 | 61 |
| 1.8 | | | | | | | | | | | | | 97 | 93 | 90 | 89 | | 100 | 91 | 75 | 70 | 67 | 64 | 64 | 63 |
| 1.9 | | | | | | | | | | | | | 100 | 97 | 93 | 92 | | | 96 | 79 | 72 | 69 | 67 | 66 | 66 |
| 2.0 | | | | | | | | | | | | | | 100 | 97 | 95 | | | 100 | 83 | 76 | 72 | 69 | 68 | 68 |
| 2.1 | | | | | | | | | | | | | | | 100 | 99 | | | | 87 | 79 | 75 | 72 | 71 | 70 |
| 2.2 | | | | | | | | | | | | | | | | 100 | | | | 90 | 82 | 78 | 74 | 73 | 72 |
| 2.3 | | | | | | | | | | | | | | | | | | | | 94 | 85 | 81 | 76 | 75 | 74 |
| 2.4 | | | | | | | | | | | | | | | | | | | | 99 | 88 | 83 | 79 | 80 | 77 |
| 2.5 | | | | | | | | | | | | | | | | | | | | 100 | 92 | 86 | 81 | 80 | 79 |
| 2.6 | | | | | | | | | | | | | | | | | | | | | 95 | 89 | 84 | 82 | 81 |
| 2.7 | | | | | | | | | | | | | | | | | | | | | 99 | 92 | 86 | 85 | 83 |
| 2.8 | | | | | | | | | | | | | | | | | | | | | 100 | 95 | 89 | 87 | 86 |
| 2.9 | | | | | | | | | | | | | | | | | | | | | | 99 | 91 | 89 | 88 |
| 3.0 | | | | | | | | | | | | | | | | | | | | | | 100 | 94 | 92 | 90 |
| 3.1 | | | | | | | | | | | | | | | | | | | | | | | 97 | 94 | 83 |
| 3.3 | | | | | | | | | | | | | | | | | | | | | | | 100 | 99 | 97 |
| 3.5 | | | | | | | | | | | | | | | | | | | | | | | | 100 | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

| Table C.2b | Height of enclosing rectangle 2.0 metres<br>Paragraph C2.2.4 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 65 | 57 | 53 | 47 | 45 | 44 | 43 | 43 | 53 | 46 | 43 | 38 | 36 | 36 | 35 | 35 | 38 | 33 | 31 | 27 | 26 | 25 | 25 | 25 | 25 |
| 1.1 | 71 | 61 | 57 | 50 | 47 | 46 | 45 | 45 | 57 | 49 | 46 | 40 | 38 | 37 | 36 | 36 | 41 | 35 | 33 | 29 | 27 | 27 | 26 | 26 | 26 |
| 1.2 | 78 | 66 | 60 | 52 | 49 | 48 | 47 | 47 | 63 | 53 | 48 | 42 | 40 | 39 | 38 | 38 | 45 | 38 | 35 | 30 | 28 | 28 | 27 | 27 | 27 |
| 1.3 | 85 | 71 | 64 | 55 | 51 | 50 | 49 | 49 | 69 | 57 | 51 | 44 | 41 | 40 | 39 | 39 | 49 | 41 | 37 | 32 | 30 | 29 | 28 | 28 | 28 |
| 1.4 | 93 | 76 | 67 | 57 | 54 | 52 | 51 | 50 | 75 | 61 | 54 | 46 | 43 | 42 | 41 | 41 | 53 | 44 | 39 | 33 | 31 | 30 | 29 | 29 | 29 |
| 1.5 | 100 | 82 | 71 | 60 | 56 | 54 | 53 | 52 | 81 | 66 | 57 | 48 | 45 | 44 | 42 | 42 | 58 | 47 | 41 | 35 | 32 | 31 | 30 | 30 | 30 |
| 1.6 | | 88 | 75 | 63 | 58 | 56 | 55 | 54 | 89 | 71 | 60 | 51 | 47 | 45 | 44 | 44 | 63 | 50 | 43 | 36 | 34 | 32 | 31 | 31 | 31 |
| 1.7 | | 94 | 79 | 66 | 61 | 59 | 57 | 56 | 96 | 76 | 64 | 53 | 49 | 47 | 46 | 45 | 69 | 54 | 46 | 38 | 35 | 34 | 33 | 32 | 32 |
| 1.8 | | 100 | 83 | 69 | 63 | 61 | 58 | 58 | 100 | 81 | 67 | 55 | 51 | 49 | 47 | 47 | 75 | 58 | 48 | 40 | 36 | 35 | 34 | 33 | 33 |
| 1.9 | | | 88 | 72 | 66 | 63 | 60 | 60 | | 86 | 71 | 58 | 53 | 51 | 49 | 48 | 81 | 61 | 51 | 41 | 38 | 36 | 35 | 34 | 34 |
| 2.0 | | | 92 | 75 | 68 | 65 | 62 | 62 | | 90 | 74 | 60 | 55 | 53 | 50 | 50 | 87 | 65 | 53 | 43 | 39 | 38 | 36 | 36 | 35 |
| 2.1 | | | 97 | 78 | 71 | 68 | 64 | 64 | | 95 | 78 | 63 | 57 | 54 | 52 | 51 | 94 | 68 | 56 | 45 | 41 | 39 | 37 | 37 | 36 |
| 2.2 | | | 100 | 82 | 74 | 70 | 66 | 65 | | 100 | 82 | 66 | 59 | 56 | 54 | 53 | 100 | 72 | 59 | 47 | 42 | 40 | 38 | 38 | 37 |
| 2.3 | | | | 85 | 76 | 72 | 69 | 67 | | | 86 | 69 | 62 | 58 | 55 | 54 | | 76 | 61 | 49 | 44 | 42 | 40 | 39 | 38 |
| 2.4 | | | | 89 | 79 | 75 | 71 | 69 | | | 90 | 71 | 64 | 60 | 57 | 56 | | 80 | 64 | 51 | 46 | 43 | 41 | 40 | 40 |
| 2.5 | | | | 92 | 82 | 77 | 73 | 71 | | | 94 | 74 | 66 | 62 | 59 | 57 | | 84 | 67 | 53 | 47 | 45 | 42 | 41 | 41 |
| 2.6 | | | | 96 | 85 | 80 | 75 | 73 | | | 99 | 77 | 69 | 64 | 60 | 59 | | 88 | 71 | 55 | 49 | 46 | 43 | 42 | 42 |
| 2.7 | | | | 100 | 88 | 82 | 77 | 75 | | | 100 | 80 | 71 | 66 | 62 | 61 | | 92 | 74 | 57 | 51 | 48 | 44 | 43 | 43 |
| 2.8 | | | | | 91 | 85 | 79 | 77 | | | | 84 | 73 | 69 | 64 | 62 | | 96 | 77 | 60 | 53 | 49 | 46 | 45 | 44 |
| 2.9 | | | | | 94 | 88 | 81 | 79 | | | | 87 | 76 | 71 | 66 | 64 | | 100 | 80 | 62 | 54 | 51 | 47 | 46 | 45 |
| 3.0 | | | | | 98 | 90 | 84 | 81 | | | | 90 | 79 | 73 | 67 | 66 | | | 84 | 64 | 56 | 52 | 48 | 47 | 46 |
| 4.0 | | | | | 100 | 100 | 100 | 100 | | | | 100 | 100 | 97 | 86 | 83 | | | 100 | 91 | 77 | 69 | 62 | 59 | 57 |
| 5.0 | | | | | | | | | | | | | | 100 | 100 | 100 | | | | 100 | 100 | 90 | 77 | 72 | 69 |
| 6.0 | | | | | | | | | | | | | | | | | | | | | | 100 | 94 | 86 | 81 |
| 7.0 | | | | | | | | | | | | | | | | | | | | | | | 100 | 100 | 94 |
| 7.5 | | | | | | | | | | | | | | | | | | | | | | | | | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

**Table C.2c** **Height of enclosing rectangle 3.0 metres**

Paragraph C2.2.4

| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 57 | 47 | 40 | 35 | 34 | 33 | 32 | 32 | 46 | 38 | 33 | 29 | 27 | 27 | 26 | 26 | 33 | 27 | 23 | 20 | 19 | 19 | 19 | 19 | 19 |
| 1.1 | 61 | 49 | 43 | 37 | 35 | 34 | 34 | 33 | 49 | 40 | 34 | 30 | 28 | 28 | 27 | 27 | 35 | 29 | 24 | 21 | 20 | 20 | 19 | 19 | 19 |
| 1.2 | 66 | 52 | 45 | 39 | 36 | 35 | 35 | 34 | 53 | 42 | 36 | 31 | 29 | 29 | 28 | 28 | 38 | 30 | 26 | 22 | 21 | 20 | 20 | 20 | 20 |
| 1.3 | 71 | 55 | 47 | 40 | 38 | 37 | 36 | 35 | 57 | 45 | 38 | 32 | 30 | 30 | 29 | 29 | 41 | 32 | 27 | 23 | 22 | 21 | 21 | 20 | 20 |
| 1.4 | 76 | 59 | 49 | 42 | 39 | 38 | 37 | 37 | 61 | 47 | 40 | 34 | 32 | 31 | 30 | 29 | 44 | 34 | 28 | 24 | 23 | 22 | 21 | 21 | 21 |
| 1.5 | 82 | 62 | 52 | 44 | 41 | 39 | 38 | 38 | 66 | 50 | 42 | 35 | 33 | 32 | 31 | 30 | 47 | 36 | 30 | 25 | 23 | 23 | 22 | 22 | 22 |
| 1.6 | 88 | 65 | 55 | 46 | 42 | 41 | 39 | 39 | 71 | 53 | 44 | 37 | 34 | 33 | 32 | 31 | 50 | 38 | 31 | 26 | 24 | 23 | 23 | 22 | 22 |
| 1.7 | 94 | 69 | 57 | 47 | 44 | 42 | 40 | 40 | 76 | 56 | 46 | 38 | 35 | 34 | 33 | 32 | 54 | 40 | 33 | 27 | 25 | 24 | 23 | 23 | 23 |
| 1.8 | 100 | 73 | 60 | 49 | 45 | 43 | 42 | 41 | 81 | 59 | 48 | 40 | 36 | 35 | 34 | 33 | 58 | 42 | 35 | 28 | 26 | 25 | 24 | 24 | 24 |
| 1.9 | | 77 | 63 | 51 | 47 | 45 | 43 | 42 | 86 | 62 | 51 | 41 | 38 | 36 | 35 | 34 | 61 | 44 | 36 | 30 | 27 | 26 | 25 | 24 | 24 |
| 2.0 | | 81 | 66 | 53 | 49 | 46 | 44 | 44 | 90 | 65 | 53 | 43 | 39 | 37 | 36 | 35 | 65 | 46 | 38 | 31 | 28 | 27 | 25 | 25 | 25 |
| 2.1 | | 85 | 69 | 56 | 50 | 48 | 45 | 45 | 95 | 68 | 56 | 45 | 41 | 39 | 37 | 36 | 68 | 49 | 40 | 32 | 29 | 28 | 26 | 26 | 26 |
| 2.2 | | 89 | 72 | 58 | 52 | 49 | 47 | 46 | 100 | 72 | 58 | 47 | 42 | 40 | 38 | 37 | 72 | 51 | 42 | 33 | 30 | 28 | 27 | 27 | 26 |
| 2.3 | | 93 | 76 | 60 | 54 | 51 | 48 | 47 | | 75 | 61 | 48 | 43 | 41 | 39 | 38 | 76 | 54 | 44 | 35 | 31 | 29 | 28 | 27 | 27 |
| 2.4 | | 98 | 79 | 62 | 56 | 52 | 49 | 49 | | 79 | 64 | 50 | 45 | 42 | 40 | 39 | 80 | 56 | 46 | 36 | 32 | 30 | 28 | 28 | 28 |
| 2.5 | | 100 | 82 | 65 | 58 | 54 | 51 | 50 | | 83 | 66 | 52 | 46 | 44 | 41 | 40 | 84 | 59 | 48 | 37 | 33 | 31 | 29 | 29 | 28 |
| 2.6 | | | 86 | 67 | 59 | 56 | 52 | 51 | | 86 | 69 | 54 | 48 | 45 | 42 | 41 | 88 | 62 | 50 | 39 | 34 | 32 | 30 | 29 | 29 |
| 2.7 | | | 90 | 70 | 61 | 57 | 54 | 52 | | 90 | 72 | 56 | 50 | 46 | 43 | 42 | 92 | 65 | 52 | 40 | 35 | 33 | 31 | 30 | 30 |
| 2.8 | | | 94 | 72 | 63 | 59 | 55 | 54 | | 94 | 75 | 58 | 51 | 48 | 44 | 43 | 96 | 68 | 54 | 42 | 37 | 34 | 32 | 31 | 30 |
| 2.9 | | | 97 | 75 | 66 | 61 | 56 | 55 | | 99 | 79 | 60 | 53 | 49 | 45 | 44 | 100 | 71 | 56 | 43 | 38 | 35 | 32 | 32 | 31 |
| 3.0 | | | 100 | 78 | 68 | 63 | 58 | 56 | | 100 | 82 | 63 | 55 | 51 | 47 | 45 | | 74 | 58 | 45 | 39 | 36 | 33 | 32 | 32 |
| 4.0 | | | | 100 | 91 | 82 | 73 | 70 | | | 100 | 87 | 74 | 66 | 59 | 56 | | 100 | 85 | 62 | 53 | 48 | 42 | 40 | 39 |
| 5.0 | | | | | 100 | 100 | 90 | 85 | | | | 100 | 96 | 85 | 73 | 68 | | | 100 | 84 | 69 | 61 | 52 | 49 | 47 |
| 6.0 | | | | | | | 100 | 100 | | | | | 100 | 100 | 89 | 82 | | | | 100 | 88 | 77 | 63 | 58 | 55 |
| 7.0 | | | | | | | | | | | | | | | 100 | 96 | | | | | 100 | 94 | 76 | 69 | 63 |
| 8.0 | | | | | | | | | | | | | | | | 100 | | | | | | 100 | 90 | 80 | 72 |
| 9.0 | | | | | | | | | | | | | | | | | | | | | | | 100 | 92 | 82 |
| 10.0 | | | | | | | | | | | | | | | | | | | | | | | | 100 | 91 |
| 10.8 | | | | | | | | | | | | | | | | | | | | | | | | | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

| Table C.2d | Height of enclosing rectangle 4.0 m<br>Paragraph C2.2.4 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 53 | 40 | 35 | 30 | 29 | 28 | 28 | 27 | 43 | 33 | 28 | 24 | 23 | 23 | 22 | 22 | 31 | 23 | 20 | 17 | 17 | 16 | 16 | 16 | 16 |
| 1.1 | 57 | 43 | 36 | 31 | 30 | 29 | 28 | 28 | 46 | 34 | 29 | 25 | 24 | 23 | 23 | 23 | 33 | 24 | 21 | 18 | 17 | 17 | 16 | 16 | 16 |
| 1.2 | 60 | 45 | 38 | 33 | 31 | 30 | 29 | 29 | 48 | 36 | 31 | 26 | 25 | 24 | 23 | 23 | 35 | 26 | 22 | 19 | 18 | 17 | 17 | 17 | 17 |
| 1.3 | 64 | 47 | 40 | 34 | 32 | 31 | 30 | 30 | 51 | 38 | 32 | 27 | 25 | 25 | 24 | 24 | 37 | 27 | 23 | 19 | 18 | 18 | 17 | 17 | 17 |
| 1.4 | 67 | 49 | 42 | 35 | 33 | 32 | 31 | 30 | 54 | 40 | 33 | 28 | 26 | 25 | 25 | 24 | 39 | 28 | 24 | 20 | 19 | 18 | 18 | 17 | 17 |
| 1.5 | 71 | 52 | 43 | 36 | 34 | 32 | 31 | 31 | 57 | 42 | 35 | 29 | 27 | 26 | 25 | 25 | 41 | 30 | 25 | 21 | 19 | 19 | 18 | 18 | 18 |
| 1.6 | 75 | 55 | 45 | 38 | 35 | 33 | 32 | 32 | 60 | 44 | 37 | 30 | 28 | 27 | 26 | 26 | 43 | 31 | 26 | 22 | 20 | 19 | 19 | 18 | 18 |
| 1.7 | 79 | 57 | 47 | 39 | 36 | 34 | 33 | 33 | 64 | 46 | 38 | 31 | 29 | 28 | 27 | 26 | 46 | 33 | 27 | 22 | 21 | 20 | 19 | 19 | 19 |
| 1.8 | 83 | 60 | 49 | 40 | 37 | 35 | 34 | 34 | 67 | 48 | 40 | 33 | 30 | 29 | 27 | 27 | 48 | 35 | 29 | 23 | 21 | 20 | 20 | 19 | 19 |
| 1.9 | 88 | 63 | 52 | 42 | 38 | 36 | 35 | 34 | 71 | 51 | 42 | 34 | 31 | 29 | 28 | 28 | 51 | 36 | 30 | 24 | 22 | 21 | 20 | 20 | 20 |
| 2.0 | 92 | 66 | 54 | 43 | 39 | 37 | 36 | 35 | 74 | 53 | 43 | 35 | 32 | 30 | 29 | 28 | 53 | 38 | 31 | 25 | 23 | 22 | 21 | 20 | 20 |
| 2.1 | 97 | 69 | 56 | 45 | 41 | 39 | 37 | 36 | 78 | 56 | 45 | 36 | 33 | 31 | 30 | 29 | 56 | 40 | 32 | 26 | 23 | 22 | 21 | 21 | 21 |
| 2.2 | 100 | 72 | 59 | 47 | 42 | 40 | 38 | 37 | 82 | 58 | 47 | 38 | 34 | 32 | 30 | 30 | 59 | 42 | 34 | 27 | 24 | 23 | 22 | 21 | 21 |
| 2.3 | | 76 | 61 | 48 | 43 | 41 | 38 | 38 | 86 | 61 | 49 | 39 | 35 | 33 | 31 | 30 | 61 | 44 | 35 | 28 | 25 | 24 | 22 | 22 | 22 |
| 2.4 | | 79 | 64 | 50 | 45 | 42 | 39 | 39 | 90 | 64 | 51 | 40 | 36 | 34 | 32 | 31 | 64 | 46 | 37 | 29 | 26 | 24 | 23 | 22 | 22 |
| 2.5 | | 82 | 66 | 52 | 46 | 43 | 40 | 40 | 94 | 66 | 53 | 42 | 37 | 35 | 33 | 32 | 67 | 48 | 38 | 30 | 27 | 25 | 23 | 23 | 23 |
| 2.6 | | 86 | 69 | 54 | 47 | 44 | 41 | 40 | 99 | 69 | 56 | 43 | 38 | 36 | 33 | 33 | 71 | 50 | 40 | 31 | 27 | 26 | 24 | 23 | 23 |
| 2.7 | | 90 | 72 | 56 | 49 | 46 | 42 | 41 | 100 | 72 | 58 | 45 | 39 | 37 | 34 | 33 | 74 | 52 | 41 | 32 | 28 | 26 | 24 | 24 | 24 |
| 2.8 | | 94 | 75 | 57 | 50 | 47 | 43 | 42 | | 75 | 60 | 46 | 41 | 38 | 35 | 34 | 77 | 54 | 43 | 33 | 29 | 27 | 25 | 24 | 24 |
| 2.9 | | 97 | 78 | 59 | 52 | 48 | 44 | 43 | | 79 | 62 | 48 | 42 | 39 | 36 | 35 | 80 | 56 | 45 | 34 | 30 | 28 | 26 | 25 | 25 |
| 3.0 | | 100 | 81 | 61 | 53 | 49 | 45 | 44 | | 82 | 65 | 50 | 43 | 40 | 37 | 36 | 84 | 58 | 46 | 35 | 31 | 28 | 26 | 25 | 25 |
| 4.0 | | | 100 | 84 | 71 | 64 | 57 | 54 | | 100 | 92 | 68 | 57 | 52 | 46 | 44 | 100 | 85 | 66 | 49 | 41 | 37 | 33 | 31 | 30 |
| 5.0 | | | | 100 | 92 | 81 | 70 | 65 | | | 100 | 90 | 74 | 66 | 56 | 53 | | 100 | 90 | 65 | 53 | 47 | 40 | 38 | 36 |
| 6.0 | | | | | 100 | 100 | 84 | 77 | | | | 100 | 94 | 82 | 68 | 62 | | | 100 | 84 | 67 | 59 | 48 | 45 | 42 |
| 7.0 | | | | | | | 100 | 90 | | | | | 100 | 100 | 81 | 73 | | | | 100 | 84 | 72 | 58 | 52 | 48 |
| 8.0 | | | | | | | | 100 | | | | | | 100 | 95 | 84 | | | | | 100 | 87 | 68 | 60 | 55 |
| 9.0 | | | | | | | | | | | | | | | 100 | 97 | | | | | | 100 | 79 | 69 | 62 |
| 10.0 | | | | | | | | | | | | | | | | 100 | | | | | | | 92 | 79 | 69 |
| 11.0 | | | | | | | | | | | | | | | | | | | | | | | 100 | 90 | 77 |
| 12.0 | | | | | | | | | | | | | | | | | | | | | | | | 100 | 85 |
| 13.0 | | | | | | | | | | | | | | | | | | | | | | | | | 94 |
| 13.7 | | | | | | | | | | | | | | | | | | | | | | | | | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

| Table C.2e | Height of enclosing rectangle 6.0 metres<br>Paragraph C2.2.4 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 47 | 35 | 30 | 26 | 25 | 24 | 23 | 23 | 38 | 29 | 24 | 21 | 20 | 19 | 19 | 19 | 27 | 20 | 17 | 15 | 14 | 14 | 14 | 13 | 13 |
| 1.1 | 50 | 37 | 31 | 27 | 25 | 25 | 24 | 24 | 40 | 30 | 25 | 22 | 20 | 20 | 19 | 19 | 29 | 21 | 18 | 16 | 15 | 14 | 14 | 14 | 14 |
| 1.2 | 52 | 39 | 33 | 28 | 26 | 25 | 24 | 24 | 42 | 31 | 26 | 22 | 21 | 20 | 20 | 19 | 30 | 22 | 19 | 16 | 15 | 14 | 14 | 14 | 14 |
| 1.3 | 55 | 40 | 34 | 28 | 26 | 26 | 25 | 24 | 44 | 32 | 27 | 23 | 21 | 21 | 20 | 20 | 32 | 23 | 19 | 16 | 15 | 15 | 14 | 14 | 14 |
| 1.4 | 57 | 42 | 35 | 29 | 27 | 26 | 25 | 25 | 46 | 34 | 28 | 24 | 22 | 21 | 20 | 20 | 33 | 24 | 20 | 17 | 16 | 15 | 15 | 14 | 14 |
| 1.5 | 60 | 44 | 36 | 30 | 28 | 27 | 26 | 25 | 48 | 35 | 29 | 24 | 22 | 21 | 21 | 20 | 35 | 25 | 21 | 17 | 16 | 15 | 15 | 15 | 15 |
| 1.6 | 63 | 46 | 38 | 31 | 28 | 27 | 26 | 26 | 51 | 37 | 30 | 25 | 23 | 22 | 21 | 21 | 36 | 26 | 22 | 18 | 16 | 16 | 15 | 15 | 15 |
| 1.7 | 66 | 47 | 39 | 32 | 29 | 28 | 27 | 26 | 53 | 38 | 31 | 26 | 23 | 22 | 21 | 21 | 38 | 27 | 22 | 18 | 17 | 16 | 15 | 15 | 15 |
| 1.8 | 69 | 49 | 40 | 33 | 30 | 28 | 27 | 27 | 55 | 40 | 33 | 26 | 24 | 23 | 22 | 22 | 40 | 28 | 23 | 19 | 17 | 16 | 16 | 15 | 15 |
| 1.9 | 72 | 51 | 42 | 34 | 31 | 29 | 28 | 27 | 58 | 41 | 34 | 27 | 25 | 23 | 22 | 22 | 41 | 30 | 24 | 19 | 18 | 17 | 16 | 16 | 16 |
| 2.0 | 75 | 53 | 43 | 35 | 31 | 30 | 28 | 28 | 60 | 43 | 35 | 28 | 25 | 24 | 23 | 22 | 43 | 31 | 25 | 20 | 18 | 17 | 16 | 16 | 16 |
| 2.1 | 78 | 56 | 45 | 36 | 32 | 30 | 29 | 28 | 63 | 45 | 36 | 29 | 26 | 24 | 23 | 23 | 45 | 32 | 26 | 21 | 19 | 17 | 17 | 16 | 16 |
| 2.2 | 82 | 58 | 47 | 37 | 33 | 31 | 29 | 29 | 66 | 47 | 38 | 30 | 27 | 25 | 24 | 23 | 47 | 33 | 27 | 21 | 19 | 18 | 17 | 17 | 16 |
| 2.3 | 85 | 60 | 48 | 38 | 34 | 32 | 30 | 29 | 69 | 48 | 39 | 31 | 27 | 26 | 24 | 24 | 49 | 35 | 28 | 22 | 19 | 18 | 17 | 17 | 17 |
| 2.4 | 89 | 62 | 50 | 39 | 35 | 32 | 30 | 30 | 71 | 50 | 40 | 32 | 28 | 26 | 24 | 24 | 51 | 36 | 29 | 23 | 20 | 19 | 17 | 17 | 17 |
| 2.5 | 92 | 65 | 52 | 40 | 36 | 33 | 31 | 30 | 74 | 52 | 42 | 32 | 29 | 27 | 25 | 24 | 53 | 37 | 30 | 23 | 20 | 19 | 18 | 17 | 17 |
| 2.7 | 100 | 70 | 56 | 43 | 37 | 35 | 32 | 31 | 80 | 56 | 45 | 34 | 30 | 28 | 26 | 25 | 57 | 40 | 32 | 25 | 22 | 20 | 19 | 18 | 18 |
| 3.0 | | 78 | 61 | 47 | 40 | 37 | 34 | 33 | 90 | 63 | 50 | 38 | 33 | 30 | 27 | 27 | 64 | 45 | 35 | 27 | 23 | 21 | 20 | 19 | 19 |
| 4.0 | | 100 | 84 | 62 | 52 | 47 | 41 | 39 | 100 | 87 | 68 | 50 | 42 | 38 | 33 | 32 | 91 | 62 | 49 | 36 | 30 | 27 | 24 | 23 | 22 |
| 5.0 | | | 100 | 81 | 66 | 58 | 49 | 46 | | 100 | 90 | 65 | 53 | 47 | 40 | 37 | 100 | 84 | 65 | 46 | 38 | 33 | 28 | 27 | 25 |
| 6.0 | | | | 100 | 82 | 71 | 59 | 54 | | | 100 | 83 | 66 | 58 | 47 | 44 | | 100 | 84 | 59 | 48 | 41 | 34 | 31 | 29 |
| 7.0 | | | | | 100 | 87 | 70 | 63 | | | | 100 | 82 | 70 | 56 | 51 | | | 100 | 74 | 58 | 50 | 40 | 36 | 33 |
| 8.0 | | | | | | 100 | 81 | 72 | | | | | 99 | 84 | 66 | 58 | | | | 90 | 71 | 60 | 47 | 42 | 38 |
| 9.0 | | | | | | | 95 | 82 | | | | | 100 | 99 | 76 | 66 | | | | 100 | 85 | 71 | 54 | 48 | 42 |
| 10.0 | | | | | | | 100 | 94 | | | | | | 100 | 88 | 75 | | | | | 100 | 83 | 63 | 54 | 47 |
| 11.0 | | | | | | | | 100 | | | | | | | 100 | 85 | | | | | | 97 | 72 | 61 | 52 |
| 12.0 | | | | | | | | | | | | | | | | 96 | | | | | | 100 | 82 | 68 | 58 |
| 13.0 | | | | | | | | | | | | | | | | 100 | | | | | | | 92 | 77 | 63 |
| 14.0 | | | | | | | | | | | | | | | | | | | | | | | 100 | 85 | 59 |
| 16.0 | | | | | | | | | | | | | | | | | | | | | | | | 100 | 83 |
| 18.4 | | | | | | | | | | | | | | | | | | | | | | | | | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

| Table C.2f | Height of enclosing rectangle 8.0 metres<br>Paragraph C2.2.4 | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Distance to *relevant boundary* (metres) | Percentage permitted unprotected area | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLED ≤ 400 MJ/m² | | | | | | | | FLED > 400 to ≤ 800 MJ/m² | | | | | | | | FLED > 800 MJ/m² | | | | | | | | |
| | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | Width of the enclosing rectangle (metres) | | | | | | | | |
| | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 2 | 3 | 4 | 6 | 8 | 10 | 15 | 20 | 30 |
| 1.0 | 45 | 34 | 29 | 25 | 23 | 23 | 22 | 22 | 36 | 27 | 23 | 20 | 19 | 18 | 18 | 17 | 26 | 19 | 17 | 14 | 13 | 13 | 13 | 13 | 12 |
| 1.1 | 47 | 35 | 30 | 25 | 24 | 23 | 22 | 22 | 38 | 28 | 24 | 20 | 19 | 18 | 18 | 18 | 27 | 20 | 17 | 15 | 14 | 13 | 13 | 13 | 13 |
| 1.2 | 49 | 36 | 31 | 26 | 24 | 23 | 22 | 22 | 40 | 29 | 25 | 21 | 19 | 19 | 18 | 18 | 28 | 21 | 18 | 15 | 14 | 13 | 13 | 13 | 13 |
| 1.3 | 51 | 38 | 32 | 26 | 24 | 24 | 23 | 22 | 41 | 30 | 25 | 21 | 20 | 19 | 18 | 18 | 30 | 22 | 18 | 15 | 14 | 14 | 13 | 13 | 13 |
| 1.4 | 54 | 39 | 33 | 27 | 25 | 24 | 23 | 23 | 43 | 32 | 26 | 22 | 20 | 19 | 19 | 19 | 31 | 23 | 19 | 16 | 14 | 14 | 13 | 13 | 13 |
| 1.5 | 56 | 41 | 34 | 28 | 25 | 24 | 23 | 23 | 45 | 33 | 27 | 22 | 20 | 20 | 19 | 19 | 32 | 23 | 19 | 16 | 15 | 14 | 13 | 13 | 13 |
| 2.0 | 68 | 49 | 39 | 31 | 28 | 26 | 25 | 24 | 55 | 39 | 32 | 25 | 23 | 21 | 20 | 20 | 39 | 28 | 23 | 18 | 16 | 15 | 14 | 14 | 14 |
| 2.5 | 82 | 58 | 46 | 36 | 31 | 29 | 27 | 26 | 66 | 46 | 37 | 29 | 25 | 23 | 22 | 21 | 47 | 33 | 27 | 20 | 18 | 17 | 15 | 15 | 15 |
| 3.0 | 98 | 68 | 53 | 40 | 35 | 32 | 29 | 28 | 79 | 55 | 43 | 33 | 28 | 26 | 23 | 23 | 56 | 39 | 31 | 23 | 20 | 18 | 17 | 16 | 16 |
| 4.0 | 100 | 91 | 71 | 52 | 43 | 39 | 34 | 32 | 100 | 74 | 57 | 42 | 35 | 31 | 27 | 26 | 77 | 53 | 41 | 30 | 25 | 22 | 20 | 19 | 18 |
| 5.0 | | 100 | 92 | 66 | 54 | 47 | 40 | 37 | | 96 | 74 | 53 | 43 | 38 | 32 | 30 | 100 | 69 | 53 | 38 | 31 | 27 | 23 | 22 | 21 |
| 6.0 | | | 100 | 82 | 66 | 57 | 47 | 43 | | 100 | 94 | 66 | 53 | 46 | 38 | 35 | | 88 | 67 | 48 | 38 | 33 | 27 | 25 | 23 |
| 7.0 | | | | 100 | 81 | 69 | 55 | 49 | | | 100 | 82 | 65 | 55 | 44 | 40 | | 100 | 84 | 58 | 46 | 40 | 32 | 28 | 26 |
| 8.0 | | | | | 97 | 82 | 64 | 56 | | | | 99 | 78 | 66 | 51 | 45 | | | 100 | 71 | 56 | 47 | 37 | 33 | 29 |
| 9.0 | | | | | 100 | 96 | 74 | 64 | | | | 100 | 92 | 77 | 59 | 52 | | | | 85 | 66 | 55 | 42 | 37 | 33 |
| 10.0 | | | | | | 100 | 84 | 72 | | | | | 100 | 90 | 68 | 58 | | | | 100 | 78 | 65 | 49 | 42 | 36 |
| 11.0 | | | | | | | 96 | 81 | | | | | | 100 | 77 | 66 | | | | | 90 | 75 | 55 | 47 | 40 |
| 12.0 | | | | | | | 100 | 91 | | | | | | | 88 | 73 | | | | | 100 | 86 | 63 | 53 | 44 |
| 14.0 | | | | | | | | 100 | | | | | | | 100 | 91 | | | | | | 100 | 79 | 65 | 53 |
| 17.0 | | | | | | | | | | | | | | | | 100 | | | | | | | 100 | 87 | 68 |
| 20.0 | | | | | | | | | | | | | | | | | | | | | | | | 100 | 86 |
| 22.2 | | | | | | | | | | | | | | | | | | | | | | | | | 100 |

**Note:** For enclosing rectangle widths greater than given in the table, an enclosing rectangle width of 20 m for FLED ≤ 800 MJ/m² and 30 m for FLED > 800 MJ/m² may be used

**Proposed text**

**C/VM2 Appendix C2.3**

**C2.3 Method 3 – Enclosing Rectangles – irregular buildings and non-parallel boundaries**

**C2.3.1** This method applies where the building is of irregular shape or the intersection angle between the *external wall* and *relevant boundary* is between 10° and 80° (see Figure C.4). The method is a variation of Method 2 and evaluates the enclosing rectangle on an assumed reference plane.

**Comment:**

Greatest advantage is obtained by locating the reference plane to achieve the maximum separation distance over the part of the wall having the largest *unprotected area*. In general, the most convenient location of the reference plane will be parallel to the *relevant boundary*.

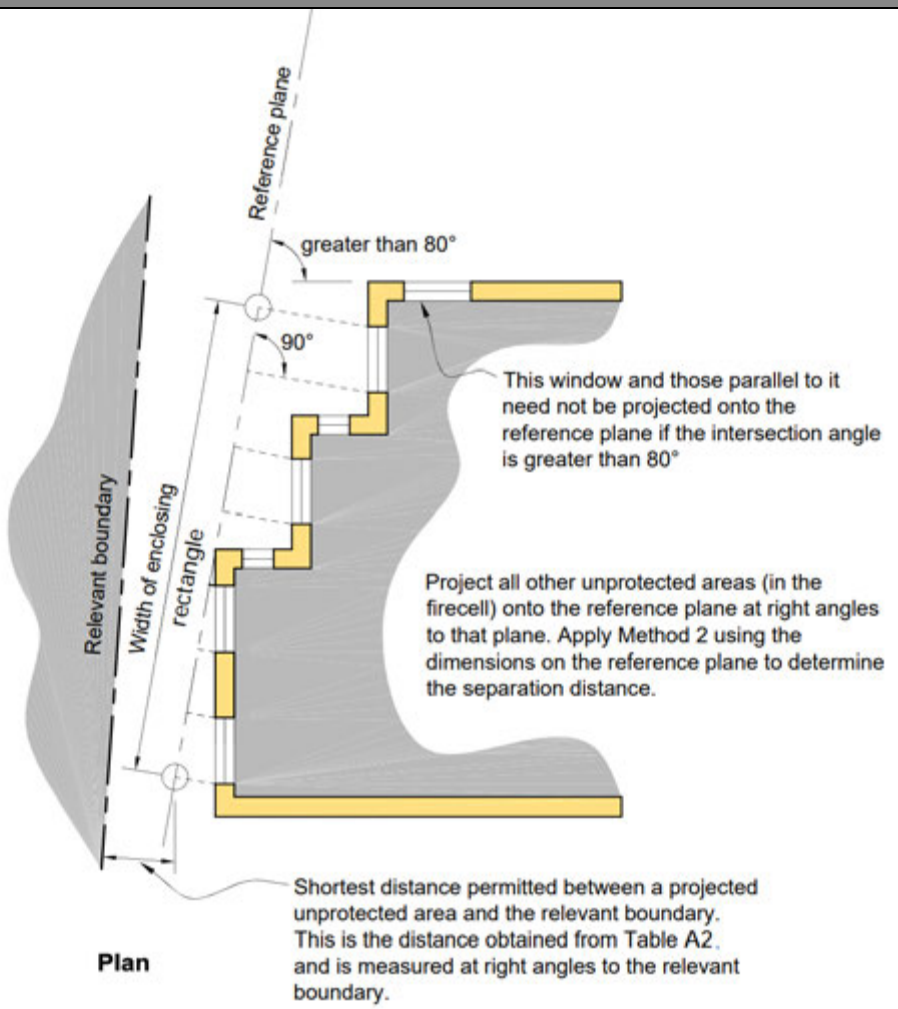
**C2.3.2** The reference plane shall be vertical, touch at least one point on the *external wall*, and not cross the *relevant boundary* within the length of the enclosure. The plane shall not pass through the enclosure, but may pass through projections such as balconies or copings.

**C2.3.3** The enclosing rectangle is determined by projecting the *unprotected areas* onto the reference plane at right angles to the plane, and the distance to the *relevant boundary* used in the calculations shall be the shortest distance between that *relevant boundary* and the closest projected *unprotected area* on the reference plane. *Unprotected areas* which are more than 80° to the reference plane are not included.

Once the enclosing rectangle is determined, comply with Paragraphs C2.2.4 to C.2.2.8 as required.

## Proposed C/VM2 Figure C.4 Method 3 – Enclosing rectangles (irregular shaped buildings and non-parallel boundaries)

| Figure C.4 | Method 3 – Enclosing rectangles (irregular shaped buildings and non-parallel boundaries)<br>Paragraph C2.3.1 |
|---|---|



**Proposed text**

**C/VM2 Appendix C2.4**

**C2.4 Method 4 – Return walls and wing walls**

**Application**

**C2.4.1** This method shall be applied to *external walls* of *buildings* where the intersection angle is 80° or greater and less than 135°. It may be used for all values of *FLED*.

**C2.4.2** This method is used to determine the length of wing walls and return walls. Protection is achieved by providing either return walls or wing walls in accordance with Paragraphs C2.4.3 to C2.4.8 depending on the construction method proposed. Where the *firecell* is sprinklered, wing walls and return walls are not required.

**Comment:**

It is more economical to use a return wall in the *firecell* of *fire* origin than to use a wing wall as a shield between that *firecell* and the property being protected.

**C2.4.3** For this method, there are two tables. Table C.3 is used for the separation from the relevant boundary with other property. Table C.4 is used for separation on the same property where one or both *firecells* being considered contains a sleeping use or is a *safe path*. When using Table C.3, separation distances are measured between *unprotected areas* in the *firecells* being considered, and the *notional boundary* coinciding with the *external wall* of the other *firecell*.

**Enclosing Rectangle dimensions**

**C2.4.4** The dimensions of the *unprotected areas* in the *external wall* of each space shall be determined by drawing a rectangle enclosing all *unprotected areas* and the protected areas between them within a maximum distance of 20 m measured at right angles to the *relevant boundary*. The dimensions of the rectangle are:

a) $A_o$ (the equivalent opening area) found by summing individual *unprotected areas* within the enclosing rectangle; and

b) $h_{eq}$ (the equivalent opening height) based on the height of the enclosing rectangle; and

c) $W_{eq}$ (equivalent opening width) found by dividing $A_o$ by $h_{eq}$.

**Comment:**

It is assumed that *unprotected areas* more than 20 m from the *relevant boundary* do not pose a radiation threat.

**Return wall and wing wall lengths for intersection angles ≥ 80° to < 90°**

**C2.4.5** The length of return walls or wing walls shall be determined from equations C.1 and C.2.

$$L_r = D_B - D_S \qquad \text{Equation C.1}$$

$$L_W = \frac{L_B \times L_r}{D_B} \qquad \text{Equation C.2}$$

$L_r$ is the return wall length (metres); and

$L_w$ is the wing wall length (metres); and

$D_B$ is the minimum permitted distance between *unprotected areas* in the *external wall* being considered and the *relevant boundary* (metres). $D_B$ is determined from Tables C.3 and C.4 based on $h_{eq}$ and $W_{eq}$ from Paragraph C2.4.4; and

$D_S$ is the shortest distance between *external wall* of the *space* bounded by *separating elements* being considered and the *relevant boundary* (metres) (see Figure C.5); and

**Proposed text**

$L_B$ is the wing wall length if that wall is located on the *relevant boundary* (metres). $L_B$ is determined from from Tables C.3 and C.4 based on $h_{eq}$ and $W_{eq}$ from Paragraph C2.4.4.

**C2.4.6** $L_r$, $D_B$ and $D_S$ are measured at right angles to the *relevant boundary* (see Figure C.5).

**C2.4.7** On the *relevant boundary*, $D_S = 0$ and therefore for a return wall $L_r = D_B$ and for a wing wall $L_w = L_B$. If $D_B$ is equal to or greater than $D_S$, the formula produces a zero or negative result and there is no requirement for a return wall or wing wall.

Comment:

1. Table C.3 and Table C.4 are based on the assumption that the equivalent opening area is located at the end of the wall nearest the *relevant boundary*. This is a conservative, but safe, simplification for determining the most severe thermal radiation likely to be emitted from a *fire* within the space bounded by *separating elements*.

**Return wall and wing wall lengths for intersection angles ≥ 90° to < 135°**

**C2.4.8** For angles of 90° or greater, the return wall length and wing wall length can be reduced linearly to give shorter return walls or wing walls by applying Equations C.3 and C.4.

$$L_f = \left(\frac{135 - \theta}{45}\right) \times (D_B - D_S)$$ Equation C.3

$$L_W = \left(\frac{135 - \theta}{45}\right) \times \frac{L_B \times L_r}{D_B}$$ Equation C.4

$L_r$ is the return wall length (metres); and

$L_w$ is the wing wall length (metres); and

$\theta$ is the intersection angle (°); and

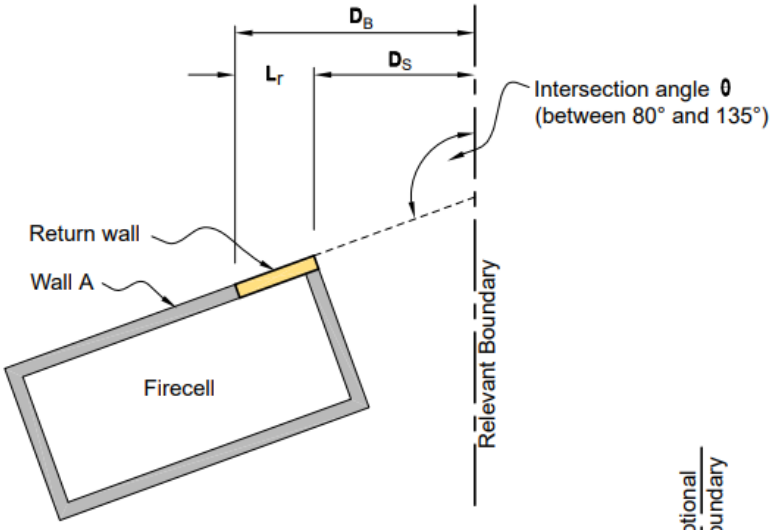
$D_B$ is the minimum permitted distance between *unprotected areas* in the *external wall* being considered and the *relevant boundary* (metres). $D_B$ is determined from Tables C.3 and C.4 based on $h_{eq}$ and $W_{eq}$ from Paragraph C2.4.4; and

$D_S$ is the shortest distance between *external wall* of the *space* bounded by *separating elements* being considered and the *relevant boundary* (metres) (see Figure C.5); and

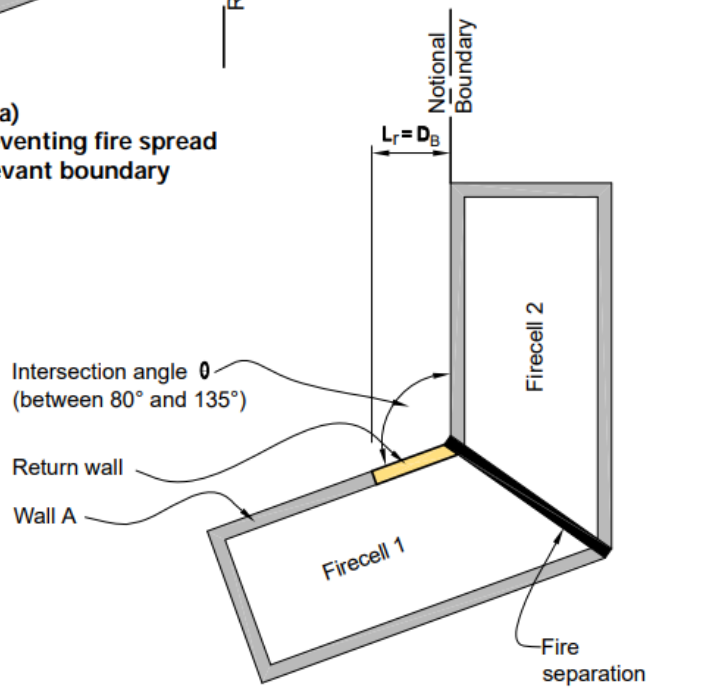
$L_B$ is the wing wall length if that wall is located on the *relevant boundary* (metres). $L_B$ is determined from from Tables C.3 and C.4 based on $h_{eq}$ and $W_{eq}$ from Paragraph C2.4.4.

## Proposed C/VM2 Figure C.5 Method 4 – Return walls on external walls having an intersection angle of between 80° and 135° with the relevant boundary or notional boundary

**Figure C.5** **Method 4 – Return walls on external walls having an intersection angle of between 80° and 135° with the relevant boundary or notional boundary**




**Plan (a)**
**Return wall length for preventing fire spread from wall A to the relevant boundary**




**Plan (b)**
**Return wall for preventing fire spread from the external wall of firecell 1 to firecell 2 in the same or adjoining building**

**Key**

**$D_S$ =** The shortest distance between the *external wall* being considered and the *relevant boundary*.

**$D_B$ =** Minimum permitted distance between *unprotected areas* in a wall and the *relevant boundary* as determined from Table A3.1 for plan (a), or the *notional boundary* as determined from Table A3.2 for plan (b).

**$L_r$ =** The required return wall length measured at right angles to the *relevant boundary* or *notional boundary* as applicable.

## Proposed C/VM2 Table C.3 Method 4 – Return walls and wing walls for unsprinklered firecells: protection of other property

| Table C.3 | Method 4 – Return walls and wing walls for unsprinklered firecells: protection of other property | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equivalent opening height $h_{eq}$ (metres) | Return walls | | | | | | | | Equivalent opening height $h_{eq}$ (metres) | Wing walls | | | | | | | |
| | Minimum separation distance between unprotected areas and notional boundary $D_B$ (metres) | | | | | | | | | Minimum length of wing wall if located on the relevant boundary $L_B$ (metres) | | | | | | | |
| | Equivalent opening width $W_{eq}$ (metres) | | | | | | | | | Equivalent opening width $W_{eq}$ (metres) | | | | | | | |
| | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 20 | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 20 |
| 1 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 1 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| 2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 2 | 0.6 | 0.9 | 1.1 | 1.2 | 1.2 | 1.3 | 1.3 | 1.3 |
| 3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 3 | 0.7 | 1.1 | 1.4 | 1.6 | 1.7 | 1.8 | 1.9 | 1.9 |
| 4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 4 | 0.7 | 1.2 | 1.6 | 1.8 | 2.1 | 2.3 | 2.4 | 2.5 |
| 6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 6 | 0.7 | 1.3 | 1.9 | 2.2 | 2.7 | 3.1 | 3.3 | 4.4 |
| 8 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.7 | 8 | 0.7 | 1.4 | 2 | 2.5 | 3.2 | 3.6 | 5.2 | 6.3 |
| 10 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.7 | 0.9 | 10 | 0.7 | 1.4 | 2.1 | 2.6 | 3.4 | 4.1 | 6.1 | 7.9 |

## Proposed C/VM2 Table C.4 Method 4 – Return walls and wing walls for unsprinklered firecells: protection of sleeping occupancies or safe paths on the same property

| Table C.4 | Method 4 – Return walls and wing walls for unsprinklered firecells: protection of sleeping occupancies or safe paths on the same property | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equivalent opening height $h_{eq}$ (metres) | Return walls | | | | | | | | Equivalent opening height $h_{eq}$ (metres) | Wing walls | | | | | | | |
| | Minimum separation distance between unprotected areas and notional boundary $D_B$ (metres) | | | | | | | | | Minimum length of wing wall if located on the relevant boundary $L_B$ (metres) | | | | | | | |
| | Equivalent opening width $W_{eq}$ (metres) | | | | | | | | | Equivalent opening width $W_{eq}$ (metres) | | | | | | | |
| | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 20 | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 20 |
| 1 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 1 | 0.8 | 1.1 | 1.2 | 1.3 | 1.3 | 1.4 | 1.4 | 1.4 |
| 2 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 2 | 1 | 1.5 | 1.9 | 2.1 | 2.3 | 2.5 | 2.6 | 2.7 |
| 3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 3 | 1.1 | 1.8 | 2.3 | 2.6 | 3.1 | 3.4 | 3.6 | 3.9 |
| 4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.8 | 0.9 | 4 | 1.2 | 2 | 2.6 | 3.1 | 3.7 | 4.2 | 4.4 | 5.1 |
| 6 | 0.4 | 0.5 | 0.7 | 0.8 | 1 | 1.1 | 1.1 | 1.2 | 6 | 1.2 | 2.2 | 3 | 3.6 | 4.6 | 5.2 | 5.8 | 7.2 |
| 8 | 0.4 | 0.5 | 0.7 | 0.9 | 1.1 | 1.3 | 1.4 | 1.5 | 8 | 1.2 | 2.3 | 3.2 | 4 | 5.2 | 6.2 | 6.8 | 8.8 |
| 10 | 0.4 | 0.5 | 0.8 | 1 | 1.3 | 1.4 | 1.5 | 1.9 | 10 | 1.2 | 2.4 | 3.4 | 4.2 | 5.6 | 6.7 | 7.6 | 10.5 |

## C/VM2 – Item 3 – Editorial: Amend text in C/VM2 to include text from the C/VM2 commentary document

Several paragraphs of C/VM2 directly reference text within the document "Commentary for Building Code Clauses C1-C6 and Verification Method C/VM2". It is more appropriate to locate this text in C/VM2, so MBIE proposes to copy it from the Commentary document into C/VM2. Additional amendments are proposed to the References section which changes the way that secondary referenced documents are treated, which will align with the way that C/AS2 treats them.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/VM2 References** | | |
| For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in this Compliance Document (primary reference documents) must be the editions, along with their specific amendments, listed below. Where these primary reference documents refer to other Standards or documents (secondary reference documents), which in turn may also refer to other Standards or documents, and so on (lower-order reference documents), then the version in effect at the date of publication of this Compliance Document must be used. | For the purposes of New Zealand Building Code compliance, the New Zealand and other Standards, and other documents referred to in this Verification Method (primary reference documents) shall be the editions, along with their specific amendments, listed below. Where the primary reference documents refer to other Standards or other documents (secondary reference documents), which in turn may also refer to other Standards or other documents, and so on (lower order reference documents), then the applicable version of these secondary and lower order reference documents shall be the version in effect at the date that the primary reference document was published. | This text is proposed to be amended to provide more clarity and aligns with the text in C/AS2 First Edition 2019. In addition, the term "Compliance Document" has been replaced with the term Verification Method to describe this document. This could have an impact on how secondary and lower order reference standards are used in design and construction of buildings. |
| **C/VM2 Part 2 Rules and parameters for the design scenarios** | | |
| **2.2.1.**<br>…<br>e) All doors not described in Paragraph 2.2.1 b), c) and d) shall be considered to be open during the analysis unless for substantiated functional | **2.2.1.**<br>…<br>e) All doors not described in Paragraph 2.2.1 b), c) and d) shall be considered to be open during the analysis unless: | This text has been amended to include requirements previously found in the Commentary document and Protection from Fire Clarifications. The proposed amendment provides further |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| reasons as established at FEB the doors can be shown to be closed throughout the time period of analysis (see Commentary). | i) there is a high likelihood that the door will be closed for security or other functional reasons throughout the time period of analysis; and<br>ii) the substantiated functional reason is established at FEB.<br>Comment:<br>Assuming the door is open will maximise the smoke flow through the *building*. | details regarding doors that are considered to be open. |
| **2.2.1**<br>…<br>p) For *design scenario* FO only, if *CFD* modelling is used the layer height shall be defined from the visibility results arranged over a number of points throughout the space. The number and location of the points where the layer height is monitored and the criteria for defining the average layer height are described in Appendix C of the commentary.<br><br>Also refer to Paragraph 2.3.3 for guidance on modelling post-*flashover fires* when evaluating life safety on *escape routes* that are not in the room of *fire* origin. | **2.2.1**<br>…<br>p) For *design scenario* FO only, if *CFD* modelling is used the layer height shall be defined from the visibility results arranged over a number of points throughout the space. The number and location of the points where the layer height is monitored and the criteria for defining the average layer height are described in Appendix D.<br><br>Also refer to Paragraph 2.3.3 for guidance on modelling post-*flashover fires* when evaluating life safety on *escape routes* that are not in the room of *fire* origin. | The reference to Appendix C of the commentary has been replaced with Appendix D to align with the proposed informative Appendix D to be included in C/VM2. |
| **C/VM2 Appendices** | | |
| | **Appendix D: Practice advice for fire modelling (informative)**<br><br>[Refer to the proposed text for Appendix D] | This Appendix was previously found in the Commentary as Appendix C. It provides guidelines on the use of fire modelling and is considered to be an informative Appendix to C/VM2. In order to create the new informative appendix, portions of the text have been re-written to provide clarity of |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | | the requirements. Appropriate paragraph numbering and headings have also been provided to the text. |

**Proposed text**

**C/VM2 Appendix D1**

**D1 Practice advice for fire modelling using zone models**

**D1.1 Room size limits when using a fire zone model for smoke-filling calculations**

**D1.1.1** Guidance has been developed on the appropriateness of using a *fire* zone model for smoke-filling calculations as part of an analysis conducted in accordance with C/VM2, based on the size and shape of the enclosure Wade (BRANZ Technical Recommendation TR17). The guidance is intended to help fire engineers assess the suitability of using a zone model for a given combination of *fire* size and compartment dimensions. However, the criteria given should not be treated as absolute constraints as they are not the only factors that may affect the decision to use a zone model or not.

**D1.1.2** The complexity of the *building* geometry and *fire* safety systems, the perceived risk associated with the design, and the *fire* safety objectives and purpose of the analysis may also influence the model selection decision. It is expected that a full range of factors applicable to the specific *building* will be considered in the selection of the appropriate model to use for a given analysis.

Recommended limits on non-dimensional HRR and shape factor

**D1.1.3** A non-dimensional shape factor is calculated for each room, where $A_f$ is the compartment floor area (in m2) and $H_e$ is the compartment height (in m).

non-dimensional shape factor: $SF = \frac{A_F}{H_e^{\,2}}$ Equation D.1

**D1.1.4** A non-dimensional *heat release rate* is calculated for the room of *fire* origin where $\dot{Q}$ is the maximum *heat release rate* (kW) during the period of interest (typically until *RSET* is reached).

non-dimensional heat release rate parameter: $\dot{Q}^* = \frac{\dot{Q}}{1110 H_e^{\,5/2}}$ Equation D.2

**D1.1.5** Recommended limits for these non-dimensional parameters are provided in Table D.1.

## Proposed C/VM2 Table D.1 Recommended limits on non-dimensional HRR and shape factor

| Table D.1 | Recommended limits on non-dimensional HRR and shape factor | |
|---|---|---|
| **Shape factor** | **Non-dimensional heat release rate** | **Application** |
| SF < 0.4 | $\dot{Q}^* \leq 0.15$ | Special consideration is required as there is higher likelihood of the plume intercepting the walls before it reaches the ceiling. A two-zone model may therefore predict a layer height which is too high and the space should preferably be treated as a "shaft". |
| 0.4 ≤ SF ≤ 70 | $\dot{Q}^* \leq 0.15$ | A single-room two-zone model is considered satisfactory. |
| SF > 70 | $\dot{Q}^* \leq 0.15$ | A multi-room two-zone model (with virtual rooms) is considered satisfactory with each room having a shape factor of 0.4 ≤ SF ≤ 70. |

**Notes**

1. In all cases it is assumed that the internal compartment geometry is relatively simple and without extensive internal obstructions interfering with the flow of smoke.
2. Wade (BRANZ Technical Recommendation TR17) should be consulted for more detailed guidance on the application of these limits and examples.

**Proposed text**

**C/VM2 Appendix D2**

**D2 Practice advice for fire modelling using CFD modelling**

**D2.1 Determining the layer height using CFD modelling**

**D2.1.1** Determining the layer height in C3.8 is easily defined when using a zone model because, by definition, a zone model is an average for the space. However, for a *CFD* model it is more complicated because of the variance throughout the space as a function of time. According to C3.8, "the smoke layer is no less than 2.0 m above the floor". For *CFD* the "layer height" is not defined. Therefore this methodology is proposed to determine the layer height within a *CFD* model for larger spaces with ceiling heights 6.0 m and above. This procedure has been designed to give a reasonable estimate of the smoke layer height without monitoring hundreds of locations or using some other qualitative method. The procedure requires two parts: defining the number of points within the space where the layer height shall be monitored; and the criteria at those points that define the layer.

**D2.2 Number of points that define the layer**

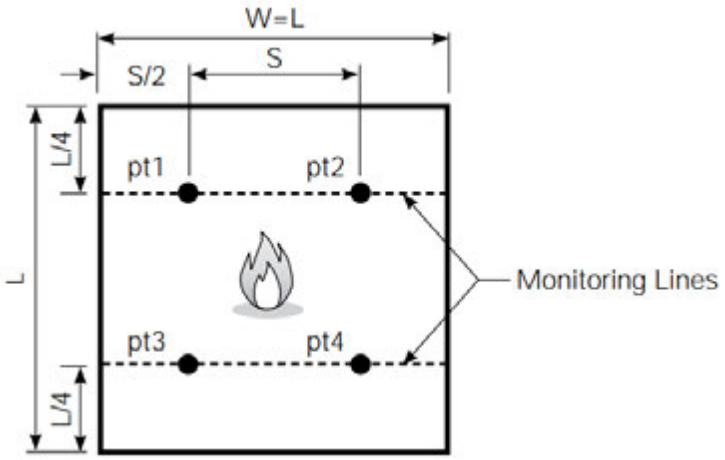
**D2.2.1** The minimum number of points for defining the layer height is based on the length (L) and width (W) of the space, where L is the smaller dimension of the space. The points should be equally spaced a distance (S) along 2 lines that are located a distance L/4 from each of the longer walls. The number of points along each of the 2 monitoring lines shall be:

$$n = 2W/L \qquad \text{Equation D.3}$$

The value for n is rounded to the nearest whole number. Therefore the minimum number of points where the visibility will be monitored is equal to 2n after n has been rounded. The distance S is calculated as S = W/n and the first monitoring point is S/2 from the L walls. Examples are provided in Figure C.1 for clarification.

## Proposed C/VM2 Figure D.1 Examples showing the number of points to define the layer when using CFD modelling

| Figure D.1 | Examples showing the number of points to define the layer when using CFD modelling |
|---|---|

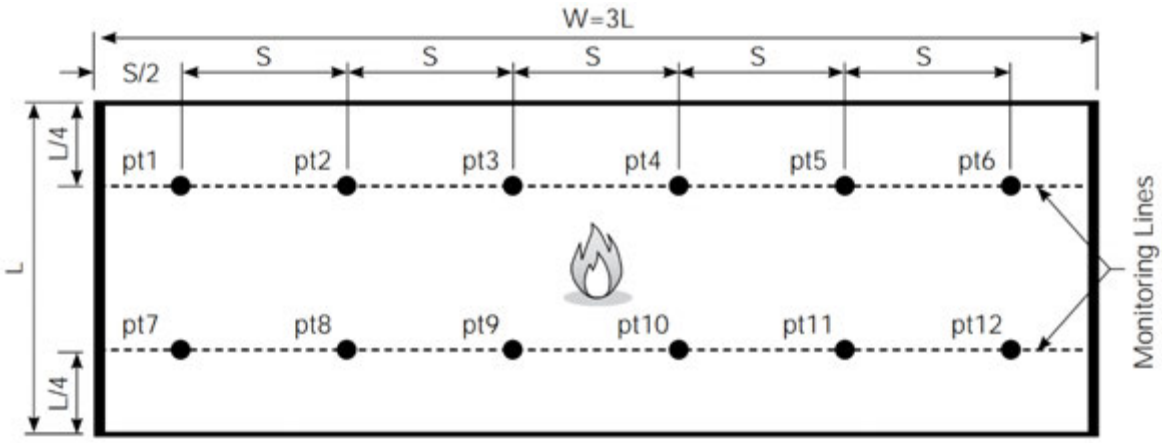



Where:

N = 2W/L = 2L/L = 2, thus the total number of monitoring points is 2n = 4

S = W/n = L/2

**(a) Example 1: Space that is length L by W where W = L**




Where:

N = 2W/L = 2(3L)/L = 6, thus the total number of monitoring points is 2n = 12

S = W/n = (3L)/6 = L/2

**(b) Example 2: Space that is length L by W where W = 3L**

**Proposed text**

**C/VM2 Appendix D2 – Continued**

**D2.3 Criteria of defining the layer**

**D2.3.1** At any particular location the layer is defined as the height where the visibility has dropped to less than 10 m. To determine when the layer has dropped to 2.0 m for the space is based on the following criteria for the monitoring points defined above.

**Simple criteria**

**D2.3.2** Layer height has reached 2.0 m when the visibility has dropped to less than 10 m at 2.0 m above the floor at any one of the points defined above.

**Complex criteria**

**D2.3.3** Layer height is considered to reach 2.0 m based on the following analysis:

Determine the time at which the visibility has dropped below 10 m at 2.0 m above the floor at each of the points defined above.

Determine the average time at which the visibility has dropped below 10 m at 2.0 m above the floor for all of the points defined above ($T_{Layer}^{AVG}$).

Calculate the standard deviation ($\sigma_{layer}$) for the time the visibility has dropped below 10 m at 2.0 m above the floor at all of the points defined above.

The time the layer ($t_{layer}$) is assumed to have reached 2.0 m is determined from the least of the following two criteria:

$$t_{layer} = 0.95\left(T_{Layer}^{AVG}\right) \text{ or} \qquad \text{Equation D.4}$$

$$t_{layer} = T_{Layer}^{AVG} - \sigma_{layer} \qquad \text{Equation D.5}$$

whichever is less.

**D2.3.4** This methodology is based on 30 different simulations for 18 different spaces and two *fire* growths. Table D.2 shows the 18 spaces analysed where L, W, H, A, and SF represent the length, width, height, floor area and shape factor ($A/H^2$) for the space. Q* (50000) gives the value of the non-dimensional heat release rate for the fire when Q = 5000 kW. The Q* value is given when Q* < 0.15 or simply out of range when Q* > 0.15, indicating the space is too large to use zone modelling as defined in Wade (BRANZ Technical Recommendation TR17). Two *fire growth* rates were used in the study, rack growth and ultrafast. Ultrafast was used in all spaces whereas the rack growth was only used in the 9.0 m and 12 m spaces.

## Proposed C/VM2 Table D.2 Room dimensions, area, shape factor and Q* for the spaces analysed in the layer height study

| Table D.2 | Room dimensions, area, shape factor and Q* for the spaces analysed in the layer height study<br>Paragraph D2.3.4 | | | | |
|---|---|---|---|---|---|
| **L (metres)** | **W (metres)** | **H (metres)** | **A ($m^2$)** | **SF** | **Q* (50000)** |
| 50 | 50 | 6 | 2500 | 69.4 | Out of range |
| 50 | 50 | 9 | 2500 | 30.9 | Out of range |
| 50 | 50 | 12 | 2500 | 17.4 | 0.09 |
| 30 | 90 | 6 | 2700 | Too large | Out of range |
| 30 | 90 | 9 | 2700 | 33.3 | Out of range |
| 30 | 90 | 12 | 2700 | 18.8 | 0.09 |
| 70 | 70 | 6 | 4900 | Too large | Out of range |
| 70 | 70 | 9 | 4900 | 60.5 | Out of range |
| 70 | 70 | 12 | 4900 | 34.0 | 0.09 |
| 40 | 120 | 6 | 4800 | Too large | Out of range |
| 40 | 120 | 9 | 4800 | 59.3 | Out of range |
| 40 | 120 | 12 | 4800 | 33.3 | 0.09 |
| 100 | 100 | 6 | 10000 | Too large | Out of range |
| 100 | 100 | 9 | 10000 | Too large | Out of range |
| 100 | 100 | 12 | 10000 | 69.4 | 0.09 |
| 60 | 180 | 6 | 10800 | Too large | Out of range |
| 60 | 180 | 9 | 10800 | Too large | Out of range |
| 60 | 180 | 12 | 10800 | Too large | 0.09 |

# C1 – C6 Protection from Fire

## MBIE propose to amend C/AS1

1. **Scope of C/AS1 and risk groups**: Amend the scope of C/AS1, including the description of risk groups, to provide clarity on the scope of Acceptable Solutions C/AS1 and C/AS2

**C/AS1 – Item 1 – Scope of C/AS1 and risk groups: Amend the scope of C/AS1, including the description of risk groups, to provide clarity on the scope of Acceptable solutions C/AS1 and C/AS2**

Acceptable Solution C/AS1 covers residential buildings where people sleep and outbuildings. C/AS1 is a simplified compliance pathway for small residential homes, however, it also includes some multi-unit dwellings. As modern construction of multi-unit dwellings becomes more unique, and complex designs increase, the technical requirements of C/AS1 do not address all the associated fire risks for these types of low-rise multi-unit residential buildings. This amendment is required to clarify the scope of the document and clarify the limitations on its use.

The expected impacts of the changes are to:

- Provide greater consistency, clarity and certainty to designers, builders and consent officers in the building consent process
- Ensure that fire safety risks in multi-unit dwellings are reduced. This means that some types of low-rise multi-unit dwellings will fall outside the scope of C/AS1 and will instead be included in the scope for C/AS2

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/AS1 Definitions** | | |
| | **Escape height**<br>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*. | The defined term *Escape height* is used in the amended scope proposed for Part 1 and is proposed to be included in the document. The definition proposed aligns with C/AS2. |
| **Escape route**<br>A continuous unobstructed route from any *occupied space* in a *building* to a *final exit* to enable occupants to reach a | **Escape route**<br>A continuous unobstructed route from any *occupied space* in a *building* to a *final exit* to enable occupants to reach a | The defined term *Escape route* is proposed to be amended to reflect the requirements of C/AS1 and remove references to C/AS3 to C/AS7 which are |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| *safe place*, and shall comprise one or more of the following: *open paths* and *safe paths*.<br>Comment:<br>Doors in an escape route are not considered to be obstructions provided they comply with C/AS1-C/AS7 and D1/AS1. | *safe place*, and shall comprise one or more of the following: *open paths* and *safe paths*.<br>Note that doors in an escape route are not considered to be obstructions provided they comply with this Acceptable Solution and D1. | no longer in effect. The proposed definition is the same as that proposed for C/AS2 to avoid any differences in interpretations. |
| | **Final exit**<br>The point at which an *escape route* terminates by giving direct access to a *safe place*. | The defined term *Final exit* is used in the definition of *Escape height* and is to be included in the document. The definition proposed aligns with C/AS2. |
| | **Intermediate floor**<br>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*. | The defined term *Intermediate floor* is used in the definition of *Escape height* and is to be included in the document. The definition proposed aligns with C/AS2. |
| **Safe place**<br>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.<br>Comment:<br>The Fire Safety and Evacuation of Buildings Regulations 2006 use the term place of safety and allow the *place of safety* to be within the building provided that it is protected with a sprinkler system. In this Acceptable Solution a *place of safety* can only be within a *building* in *Risk Group* SI. | **Safe place**<br>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. | The defined term *Safe place* is to be amended to remove reference to requirements for risk group SI which are not found in C/AS1. The definition proposed aligns with C/AS2. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | **Theatre**<br>A place of assembly intended for the production and viewing of performing arts, and consisting of an auditorium and stage with provision for raising and suspending stage scenery above and clear of the working area. | The defined term *Theatre* is used in the amended scope proposed for Table 1.1 in C/AS1 as it is a term used in the descriptions of other risk groups. The definition proposed aligns with C/AS2. |
| | **Wharenui**<br>A communal meeting house having a large open floor area used for both assembly and sleeping in the traditional Māori manner. | The defined term *Wharenui* is used in the amended scope proposed for Table 1.1 in C/AS1 as it is a term used in the descriptions of other risk groups. The definition proposed aligns with C/AS2. |
| **C/AS1 Part 1 General** | | |
| **1.1 Introduction and scope**<br>This Acceptable Solution can be used for establishing compliance with NZBC C1 to C6 Protection from Fire. It is one of a suite of Acceptable Solutions C/AS1 to C/AS7, each of them corresponding to a *risk group* (summarised in Table 1.1 and defined in Paragraph 1.1.1).<br>If the uses of a *building*, or part of a *building*, cover more than one *risk group*, one or more of these Acceptable Solutions may need to be followed to demonstrate compliance. Paragraph 1.2 explains how to determine the relevant risk groups for the *building* activities.<br>Notes shown under 'Comment', occurring throughout this document, are for guidance purposes only and do not form part of this Acceptable Solution. Words in *italic* are defined at the front of this document. For Part 1 of | **1.1 Introduction and scope**<br>This Acceptable Solution is one of three Acceptable Solutions that provide a means of establishing compliance with NZBC Clauses C1 to C6 Protection from Fire. It can be used for the building activities covered by *risk group* SH as specified in Paragraph 1.1.1 and described in Table 1.1.<br>For other *risk groups*, please refer to Acceptable Solution C/AS2.<br>For backcountry huts, please refer to Acceptable Solution BCH/AS1.<br><br>Notes shown under 'Comment', occurring throughout this document, are for guidance purposes only and do not form part of this Acceptable Solution. Words in *italics* are defined at the front of this document. | The Acceptable Solutions C/AS2 to C/AS7 were combined into a new single document C/AS2. The compliance pathway for backcountry huts (BCH/AS1) was created to cover all relevant Building Code clauses. Thus, the scope of C/AS1 is to be amended to reference these and reflect the current compliance pathways. The proposed text mirrors that from the new C/AS2. Reference to the commentary document has been removed to limit confusion on the scope of the amended C/AS1 document. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| this Acceptable Solution, paragraphs containing similar information are allocated the same reference numbers as Acceptable Solutions C/AS2 to C/AS6. If there is no corresponding information in this Acceptable Solution, the numbering is preserved by the notation: "THIS PARAGRAPH DELIBERATELY LEFT BLANK". For other parts of this Acceptable Solution, the numbering loosely follows that of C/AS2 to C/AS6 but it retains consecutive numbering.<br>Appendices to this Acceptable Solution have equal status to this Acceptable Solution. Note that the Appendices have been included in their entirety but not all requirements are relevant to risk growth SH.<br>Comment:<br>It is recommended that the commentary document for Acceptable Solutions C/AS1 to C/AS7 be read in conjunction with this Acceptable Solution.<br><br>**Comment:**<br>1. Designing a *building* to provide *fire* safety involves decisions on both the *construction* materials and layout needed to reduce the risk to an acceptable level. The risk is assessed according to: the number and mobility of the occupants (*occupant load* and *risk group* of the *building*); the activities undertaken within the *building*; and the nature of the *building* materials and contents. This assessment | Appendices to this Acceptable Solution are part of, and have equal status to, the Acceptable Solution. Note that the Appendices have been included in their entirety but not all requirements are relevant to *risk group* SH.<br>Figures are informative only; the wording of the paragraphs takes precedence.<br><br>**Comment:**<br>1. Designing a *building* to provide *fire* safety involves decisions on both the *construction* materials and layout needed to reduce the risk to an acceptable level. The risk is assessed according to: the number and mobility of the occupants (*occupant load* and *risk group* of the *building*); the activities undertaken within the *building*; and the nature of the *building* materials and contents. This assessment | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| allows each *building* activity to be categorised in a *risk group*, which is the basis for determining *fire* safety features.<br>The *fire* safety requirements for *risk group* SH do not depend on the *occupant load* of the *firecells*.<br>2. Outbuilding is a classified use (Building Code Clause A1). The term applies to a *building* or use which may be included within each of the other classified uses but is not intended for human habitation, and is accessory to the principal use of associated buildings. Examples: a carport, farm building, garage, greenhouse, machinery room, private swimming pool, public toilet, or shed. Refer to the Commentary for Acceptable Solutions C/AS1 to C/AS7 for guidance on the interpretation of what constitutes an outbuilding. | allows each *building* activity to be categorised in a *risk group*, which is the basis for determining *fire* safety features.<br>The *fire* safety requirements for *risk group* SH do not depend on the *occupant load* of the *firecells*.<br>2. Outbuilding is a classified use (Building Code Clause A1). The term applies to a *building* or use which may be included within each of the other classified uses but is not intended for human habitation, and is accessory to the principal use of associated buildings. Examples: a carport, farm building, garage, greenhouse, machinery room, private swimming pool, public toilet, or shed. | |
| **Table 1.1 Risk groups and Acceptable Solutions** | **Table 1.1 Risk groups: scope and limitations**<br>[Refer to proposed table on following pages] | Table 1.1 outlines the applicable risk groups cited in C/AS1 and C/AS2 along with a description of their intended occupancies. With the new single document C/AS2, risk groups SM, SI, CA, WB, WS and VP are found in one document and their references have been amended. Additionally, the application of the risk groups has been amended to be more specific to the intended scope of the risk groups and is intended to match the descriptions in C/AS2. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Scope**<br>**1.1.1** The scope of this Acceptable Solution is restricted to risk group SH. This covers buildings where people sleep including multi-unit residential with some restrictions on height and outbuildings (as described in Clause A1 7.0 of NZBC).<br>This includes the following:<br>a) Single household units<br>b) Multi-unit dwellings with no more than one unit above another (see Figure 1.1) and where each unit has an escape route independent of all other units, and including associated garages or carports whether or not they are part of the same building<br>c) Detached dwellings used as boarding houses for fewer than six people (not including members of the residing family)<br>d) Garages that are part of a household unit, and<br>e) Garages shared by more than one household unit. The garage shall be fire separated from each adjacent household unit with fire rated construction of 30/30/30. | **Scope**<br>**1.1.1** The scope of this Acceptable Solution is restricted to risk group SH. This covers buildings where people sleep including multi-unit residential with some restrictions on height and outbuildings (as described in Clause A1 7.0 of NZBC).<br>This includes the following:<br>a) Single household units, and<br>b) Low-rise multi-unit dwellings with no more than one household unit above another (see Figure 1.1) and where each household unit has an escape route independent of all other household units, and including associated garages or carports whether or not they are part of the same building. Where there is one household unit above another, the escape height shall be less than 4 m, and<br>c) Detached dwellings used as boarding houses for fewer than six people (not including members of the residing family), and<br>d) Garages that are part of a household unit, and<br>e) Garages shared by more than one household unit. The garage shall be fire separated from each adjacent household unit with fire rated construction of 30/30/30. | The scope of C/AS1 is to be updated to reflect a clear statement of the intended scope and applicable heights of construction for multi-unit dwellings. The term escape height is a defined term that is used to specify fire safety features in C/AS2.<br><br>A standard residential home contains floor to ceiling heights between 2.4 metres to 3.0 metres. The proposal of an escape height of 4.0 m for multi-unit dwellings would permit two single storey household units to be constructed (one on top of another) with allowances in the escape height for raised foundations and minor changes in level to enter the bottom unit. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Outside the scope of this Acceptable Solution**<br>**1.1.2** *Buildings* or parts of *buildings* in *risk groups* other than SH are outside the scope of this Acceptable Solution. Refer to Table 1.1 and use the corresponding Acceptable Solution instead.<br>**1.1.3** THIS PARAGRAPH DELIBERATELY LEFT BLANK<br>**1.1.4** THIS PARAGRAPH DELIBERATELY LEFT BLANK<br>Hazardous substances not covered by this Acceptable Solution<br>**1.1.5** This Acceptable Solution does not provide for any use, storage or processing of *hazardous substances*. Compliance with NZBC F3 and the Hazardous Substances and New Organisms Act 1996 shall be ensured where applicable in addition to the requirements of this Acceptable Solution. | **Outside the scope of this Acceptable Solution**<br>**1.1.2** *Buildings* or parts of *buildings* in *risk groups* other than SH are outside the scope of this Acceptable Solution (refer to Table 1.1 for other *risk groups*).<br>**1.1.3** If this Acceptable Solution cannot be followed in full, use another path to demonstrate compliance.<br>**The control of hazardous substances is not covered by this Acceptable Solution**<br>**1.1.4** This Acceptable Solution does not provide for any use, storage or processing of *hazardous substances*. Compliance with NZBC F3 and the Hazardous Substances and New Organisms Act 1996 shall be ensured where applicable in addition to the requirements of this Acceptable Solution. | The scope of the document and references to hazardous substances has been amended to align with the requirements and wording from C/AS2. This text provides more clarity to the requirements. |
| **1.2 Using this Acceptable Solution**<br>**1.2.1** The process for using this Acceptable Solution shall be as follows.<br>**Step 1: Determine which Acceptable Solutions apply**<br>Determine the *risk group* for each of the activities carried out in the *building* (refer to Table 1.1 and to Paragraph 1.1.1 of this and the other Acceptable Solutions). If the activity is not listed explicitly, choose the nearest suitable *risk group*.<br>DELIBERATELY LEFT BLANK | **1.2 Using this Acceptable Solution**<br>**1.2.1** The process for using this Acceptable Solution shall be as follows.<br>**Step 1: Determine which Acceptable Solution applies**<br>Determine the *risk group* for each of the activities carried out in the *building* (refer to Table 1.1 and to Paragraph 1.1.1 of this Acceptable Solution). If the activity is not listed explicitly, choose the nearest suitable *risk group*.<br>If the *building* contains a *risk group* other than SH, use | The text describing the use of C/AS1 has been amended to maintain consistency with the scope of the document for use with risk group SH. Previously, the wording was generic across C/AS1 to C/AS7 and contained many paragraphs "DELIBERATELY LEFT BLANK" which adds to confusion when using the document. |

| Current text | Proposed text | Explanation and justification for change |
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| DELIBERATELY LEFT BLANK<br>DELIBERATELY LEFT BLANK<br>Comment:<br>Firecells: The Acceptable Solutions use the concept of *firecells* to divide *buildings* into compartments. Each *firecell* can be considered individually in the first instance and subsequently the *fire* safety requirements for the whole *building* can be developed, for example when considering a multi-storey *building* that has different activities on a number of floors, or even has different activities/uses on the same floor.<br>Future flexibility: A *building* is very likely to undergo one or more changes of use over its lifetime. Even under the same use, floor layout and furnishing will alter to accommodate changes in technology and occupant practices. Therefore, at the time of initial *construction*, *owners* should consider the advantages of providing for *fire safety systems* to suit alternative occupancies as these systems could be difficult or excessively expensive to install at a later date.<br>**Step 2: Determine the parameters for risk group SH**<br>a) Establish the relevant building measurements (these will include building height, floor plans, wall openings and distances to relevant boundaries). | another path to demonstrate compliance.<br>Apply this Acceptable Solution for buildings only containing *risk group SH* by following Steps 2 and 3.<br>**Step 2: Determine the parameters for risk group SH**<br>Establish the relevant building measurements (these will include building height, floor plans, wall openings and distances to relevant boundaries). | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| b) DELIBERATELY LEFT BLANK.<br><br>**Comment:**<br>Applying the Acceptable Solution depends largely on the basic *building* measurements as above. Therefore, you should determine these as accurately as possible before using this document.<br><br>**Step 3: Satisfy the fire safety requirements**<br>Satisfy the fire safety requirements of this Acceptable Solution (refer to Parts 2-7), based on the building's dimensions and features where required.<br>**Primary risk groups**<br>**1.2.2** THIS PARAGRAPH DELIBERATELY LEFT BLANK<br>1.2.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK | **Comment:**<br>Applying the Acceptable Solution depends largely on the basic *building* measurements as above. Therefore, you should determine these as accurately as possible before using this document.<br><br>**Step 3: Satisfy the fire safety requirements**<br>Satisfy the fire safety requirements of this Acceptable Solution (refer to Parts 2-7), based on the building's dimensions and features where required. | |
| **1.3 Alterations and changes of use to buildings**<br>If this Acceptable Solution is the basis of compliance of *building work* relating to an *alteration*, addition or change of use of an existing *building*, the *building work* shall comply fully with this Acceptable Solution.<br><br>Comment:<br>Sections 112 and 115 of the Building Act require the *means of escape from fire* of an existing *building* being altered, or the use being changed, to comply as nearly as is reasonably practicable with the Building Code.<br>Parts 1, 2, 3, and 4 of this Acceptable Solution may be | **1.3 Alterations and changes of use to buildings**<br>**1.3.1** This Acceptable Solution may be used to determine the compliance of building work (in relation to an existing building). | The scope of the document and references Alterations and changes of use has been amended to align with the requirements and wording from C/AS2 in order to add clarity and consistency in the interpretation of the requirements. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| used for an assessment of the *means of escape from fire* of an existing *building* that is being altered, to meet the requirements of section 112 of the *Building Act*.<br>Parts 1, 2, 3, and 4 of this Acceptable Solution may be used for an assessment of the *means of escape from fire*, and Part 5 for the assessment of *fire* rating performance, where an existing *building* is undergoing a change of use, to meet the requirements of section 115 of the Building Act. The extent of assessment of the *means of escape from fire* of an existing *building* should follow the guidelines issued by MBIE "Requesting information about means of escape from fire for existing buildings". This considers a number of risk factors including:<br>a) Age of the *building*<br>b) Importance level of the *building*<br>c) Extent of the *alteration*.<br>An existing *building* with a high *risk score* from the guidelines should be assessed against all of the *building* systems and features specified in Parts 1, 2, 3 and 4 of this Acceptable Solution, or alternatively be assessed using Verification Method C/VM2. Sections 112 and 115 of the *Building Act* require the existing *building* to comply with other parts of the Building Code to at least the same extent as before the *alteration* or addition. | | |

## Proposed C/AS1 Table 1.1 Risk groups: scope and limitations

| Table1.1 | Risk groups: scope and limitations | |
|---|---|---|
| | ***Risk group*** | **Applies to** |
| C/AS1 | **SH Buildings with sleeping (residential) and outbuildings** | **Detached dwellings with a single *household unit* such as:** stand-alone houses<br>**Low-rise *multi-unit dwellings* where each *household unit* has its own *escape route* that is independent of all other *household units* such as:** stacked *household units* where there is no more than one *household unit* above another and the *escape height* is less than 4.0 m, attached townhouses<br>**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<br>**Outbuildings** |
| Acceptable Solution C/AS2 | **SM* Sleeping (non-institutional)**<br>(Out of scope for Acceptable Solution C/AS1) | **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).<br>**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 breakfasts). *Wharenui* and other community sleeping spaces such as halls (even if used occasionally). Sheltered housing such as refuges, reintegration for prisoners, homeless shelters etc.<br>**Educational accommodation such as:** University halls of residence, school boarding hostels etc. |
| | **SI* Care or detention**<br>(Out of scope for Acceptable Solution C/AS1) | **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.<br>**Detention facilities (excluding prisons) such as:** Police stations, court *buildings* and hospitals with detention facilities. |
| | **CA* Public access and educational facilities**<br>(Out of scope for Acceptable Solution C/AS1) | **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. |

| | | |
|---|---|---|
| Acceptable Solution C/AS2 | | 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).<br>**Personal service activities such as**: Dentists, doctors (except as included within ***risk group* SI**), banks, beautician and hairdressing salons. |
| | **WB* Business, commercial and low level storage**<br>(Out of scope for Acceptable Solution C/AS1) | **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.<br>**Industrial activities such as**: Factories, processing and manufacturing plants (excluding *foamed plastics*) with a capable height of storage of less than 3.0 m.<br>**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, 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.<br>**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**<br>(Out of scope for Acceptable Solution C/AS1) | **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**.<br>**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**<br>(Out of scope for Acceptable Solution C/AS1) | **Vehicle parking – within a building or a separate building including:**<br>Car parking *buildings*. Vehicle parking or stacking within *buildings*. Goods vehicle parking. Service vehicle and unloading areas. Car storage warehouses. |
| **Note:**<br>* ***Risk groups* SM**, **SI**, **CA**, **WB**, **WS** and **VP** are outside the scope of Acceptable Solution C/AS1. Refer to C/AS2. | | |

# C1 – C6 Protection from Fire

## MBIE propose to amend C/AS2

1. **Scope of risk groups:** Amend the scope of the risk group SH to provide clarity on the scope of Acceptable solutions C/AS1 and C/AS2
2. **Means of escape:** Amend the means of escape requirements to improve clarity and consistency of application of C/AS2
3. **Group sleeping areas:** Amend requirements for group sleeping areas ensuring spaces are provided with adequate fire safety
4. **Cladding requirements:** Amend fire testing requirements for cladding systems to reference large scale international test standards and align C/AS2 and C/VM2
5. **Control of external fire spread:** Amend requirements for control of external fire spread to enhance clarity and usability of the document
6. **Firefighting:** Amend requirements for firefighting operations to enable more efficient and effective fire service response and better align the requirements between Fire Emergency NZ (FENZ) operational requirements and the Building Code
7. **Editorial:** Amend text throughout the document to provide further clarity of requirements
8. **Errata from 2019:** Amend text in three locations (previously issued as an Errata to C/AS2 in October 2019)

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/AS2 References** | | |
| **Standards New Zealand**<br>AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter<br>*Amend*: 1<br>Where quoted: Table 5.5 | **Standards New Zealand**<br>AS/NZS 3837: 1998 Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter<br>*Amend*: 1<br>Where quoted: C7.1.1 | **C/AS2 Item 4: Cladding requirements**<br>The testing requirements for small scale testing of cladding materials are proposed to be moved from Table 5.5 to an appropriate location in Appendix C. |
| NZS 4332: 1997 Non-domestic passenger and goods lifts<br>Where quoted: 6.3.3, Table 2.2 | Deleted | **C/AS2 Item 7: Editorial**<br>References to NZS 4332 are proposed to be removed from the document and replaced with reference to NZBC Clause D2 which provides more details for the installation of lifts. |
| AS/NZS 5601 Gas installation<br>Part 1: 2010 General installations<br>*Amend*: 1<br>Where quoted: 7.2.1, 7.2.2. | Deleted | **C/AS2 Item 7: Editorial**<br>Reference to AS/NZS 5601 is proposed to be removed from the document and replaced with reference to NZBC Clause G11. |
| AS/NZS 60598 Luminaires<br>Part 2.2: 2001 Particular requirements – recessed luminaires<br>*Amend*: 1<br>Where quoted: 7.4.1 | Deleted | **C/AS2 Item 7: Editorial**<br>Reference to AS/NZS 60598 is proposed to be removed and replaced with reference to NZBC Clause G9. |
| **Standards Australia** | **Standards Australia**<br>AS 5113: 2016 Classification of external walls of buildings based on reaction-to-fire performance<br>*Amend: 1*<br>Where quoted: 5.8.3 | **C/AS2 Item 4: Cladding requirements**<br>This standard is proposed to be referenced as an option for compliance with external wall cladding requirements. It was previously referenced as a classification standard for the performance of external wall cladding systems in the guidance document "Fire performance of external wall cladding systems" released in 2019. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **International Standards Organisation**<br>ISO 5660:-<br>Part 1: 2002 Heat release rate (cone calorimeter method)<br>Where quoted: C4.1.2, C7.1.1, C7.1.2, Tables 5.5, C1.1 | **International Standards Organisation**<br>ISO 5660:-<br>Part 1: 2002 Heat release rate (cone calorimeter method)<br>Where quoted: C4.1.2, C7.1.1, C7.1.2, Table C1.1 | **C/AS2 Item 4: Cladding requirements**<br>The requirements for small scale testing of cladding materials are proposed to be moved from Table 5.5 to an appropriate location in Appendix C. |
| **British Standards Institution** | **British Standards Institution**<br>BS 8414- Fire performance of external cladding systems<br>Part 1: 2015+A1: 2017 Test method for non-loadbearing external cladding systems applied to the masonry face of a building<br>Where quoted: 5.8.3<br><br>Part 2: 2015+A1: 2017 Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame<br><br>Where quoted: 5.8.3 | **C/AS2 Item 4: Cladding requirements**<br>This standard is proposed to be referenced as an option for compliance with external wall cladding requirements. It was previously referenced as a fire test method in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| **European Standards**<br>EN 13501 Fire classification of construction products and building elements<br>Part 1: 2007 Classification using test data from reaction to fire tests<br>Amend: 1<br><br>Where quoted: Table C1.1 | **European Standards**<br>BS EN 13501- Fire classification of construction products and building elements<br>Part 1: 2018 Classification using test data from reaction to fire tests<br><br>Where quoted: Definitions, C4.1.1, Table C1.1 | **C/AS2 Item 4: Cladding requirements**<br>This standard referenced is proposed to be updated to reflect the most recent version of the standard. |
| **National Fire Protection Association**<br>NFPA 285: 2012 Standard method of test for the evaluation of flammability characteristics of exterior non-loadbearing wall assemblies | **National Fire Protection Association**<br>NFPA 285: 2019 Standard fire test method for evaluation of fire propagation characteristics of exterior wall assemblies | **C/AS2 Item 4: Cladding requirements**<br>This standard referenced is proposed to be updated to reflect the most recent version of the standard. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| containing components using the intermediate scale, multi-storey test apparatus<br><br>Where quoted: 5.8.2 | containing combustible components<br><br>Where quoted: 5.8.3 | |
| | **BRE Global**<br>BR 135: 2013 Fire performance of external thermal insulation for walls of multi-storey buildings Third Edition<br><br>Where quoted: 5.8.3 | **C/AS2 Item 4: Cladding requirements**<br>This document is proposed to be referenced as an option for compliance with external wall cladding requirements. It was previously referenced in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| **C/AS2 Definitions** | | |
| **Backcountry hut**<br>A building that - | **Backcountry hut**<br>A *building* that - | **C/AS2 Item 7: Editorial**<br>The defined term 'Building' is proposed to be italicized. |
| **Building element**<br>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 element**<br>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. | **C/AS2 Item 7: Editorial**<br>Italics of the word 'drain' are proposed to be removed as it is not a defined term. |
| **Communal service functions**<br>Spaces that provide day to day service function to support the sleeping areas and are higher *fire* risk than *direct support functions*. These are generally enclosed spaces, and include but are not limited to offices, waiting rooms, lounges, stores, dining rooms, laundries, kitchens. | **Communal service functions**<br>Spaces that provide day to day service function to support the sleeping areas and are higher *fire* risk than *direct support functions*. These are generally enclosed spaces which include, but are not limited to: offices, waiting rooms, lounges, stores, dining rooms, laundries and kitchens. | **C/AS2 Item 3: Group sleeping areas**<br>This proposal amends the definition to use proper grammar and punctuation for a list. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Dead end**<br>That part of an *open path* where escape is possible in only one direction. A dead end ceases to exist 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*. | **Dead end**<br>That part of an *open path* where escape is possible in only one direction. | **C/AS2 Item 7: Editorial**<br>This proposal moves a portion of the definition of "dead end" into Paragraph 3.8.1 so that the defined term does not contain a normative requirement. |
| **Escape route**<br>…<br>Note that doors in an escape route are not considered to be obstructions provided they comply with this Acceptable Solution and D1/AS1 | **Escape route**<br>…<br>Note that doors in an escape route are not considered to be obstructions provided they comply with this Acceptable Solution and NZBC Clause D1 | **C/AS2 Item 7: Editorial**<br>This proposal changes the reference from D1/AS1 to D1. This is further discussed in proposed changes in Part 3. |
| **Group sleeping area**<br>A *firecell* containing communal sleeping accommodation for a specified number of people who may or may not be known to one another. Partial subdivision within the *firecell* is permitted with specific limitation including that no *occupied space* is fully enclosed and all *occupied spaces* are open and available to all occupants at any time. A *group sleeping area firecell* may include spaces for associated *direct support functions*, such as hygiene facilities and tea making (not cooking) activities, for use by the occupants. It does not include spaces such as waiting rooms, lounges, dining rooms or kitchens, providing a *communal service function* for all occupants. | **Group sleeping area**<br>A *firecell* containing communal sleeping accommodation for a specified number of people who may or may not be known to one another. | **C/AS2 Item 3: Group sleeping areas**<br>It is proposed to move a portion of the definition of "group sleeping area" into Paragraph 4.5 so that the defined term does not contain a normative requirement. |
| | **Hard-standing**<br>A hard-surfaced area that is sufficiently stable to carry a fire truck, and includes a road. | **C/AS2 Item 6: Firefighting**<br>The definition of hard-standing is proposed to be added to assist with the interpretations |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | | of requirements in Part 6: Firefighting. |
| | **Limited combustible**<br>A material that does not comply with the requirements for a *non-combustible* material and is classified as A2 when tested to BS EN 13501-1. | **C/AS2 Item 4: Cladding**<br>It is proposed to create a new definition based on the European classification of materials. A classification of A2 would general capture materials that contain minor amounts of combustible materials but are unlikely to significantly contribute to fire spread. The use of the term was previously referenced in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| **Non-combustible**<br>Material either composed entirely of glass, concrete, steel, brick/block, ceramic tile, or aluminium; or classified as non-combustible when tested to AS 1530.1. | **Non-combustible**<br>Material either—<br>a) composed entirely of glass, concrete, steel, brick/block, ceramic tile, or aluminium; or<br>b) classified as non-combustible when tested to AS 1530.1; or<br>c) classified as A1 in accordance with BS EN 13501-1. | **C/AS2 Item 4: Cladding**<br>The definition is proposed to be amended to reference an alternate test method (BS EN 13501-1) for determining the non-combustibility of materials. The BS EN 13501-1 test method was previously referenced in the guidance document "Fire performance of external wall cladding systems" released in 2019. |
| **Relevant boundary**<br>…<br>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.*<br>… | **Relevant boundary**<br>…<br>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.*<br>… | **C/AS2 Item 7: Editorial**<br>'Open space' is proposed to be italicised because it is a defined term. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | **Remote receiving centre**<br>A monitoring centre for taking immediate action as a result of fire alarm and/or other off-normal signals | **C/AS2 Item 6: Firefighting**<br>The new defined term 'remote receiving centre' is proposed to assist with the interpretation of requirements in Part 6: Firefighting and align with terminology used in the standard NZS 4412. |
| **Suite**<br>A *firecell* providing residential accommodation for the exclusive use of one *person* or of several people known to one another. It comprises one or more rooms for sleeping and may include spaces used for associated domestic activities such as hygiene and cooking. | **Suite**<br>A *firecell* providing residential accommodation for the exclusive use of one person or of several people known to one another. It comprises one or more rooms for sleeping and may include spaces used for associated domestic activities such as hygiene and cooking. A suite may include transient or educational accommodation. | **C/AS2 Item 3: Group sleeping areas**<br>It is proposed to amend the definition of suite to include transient or educational activities (as opposed to permanently occupied residential which would be covered by household unit) |
| **Unprotected area**<br>…<br>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.<br>… | **Unprotected area**<br>…<br>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.<br>… | **C/AS2 Item 7: Editorial**<br>The defined term 'combustible' is proposed to be italicized. |
| **C/AS2 Part 1 General** | | |
| **Introduction and scope**<br>…<br>For ***risk group* SH**, please refer to Acceptable Solution C/AS1<br>… | **Introduction and scope**<br>…<br>For ***risk group* SH**, please refer to Acceptable Solution C/AS1<br>… | **C/AS2 Item 7: Editorial**<br>The defined term 'risk group SH' is proposed to be in bold to match the formatting in the rest of the document. |
| **Table 1.1 Risk groups: scope and limitations**<br>**SH**<br>Low-rise small *multi-unit dwellings* that have no more than two levels (one *household* | **Table 1.1 Risk groups: scope and limitations**<br>**SH**<br>**Detached dwellings with a single *household unit* such as:**<br>stand-alone houses | **C/AS2 Item 1: Scope of risk groups**<br>The description of this risk group is proposed to be amended to align with the new |

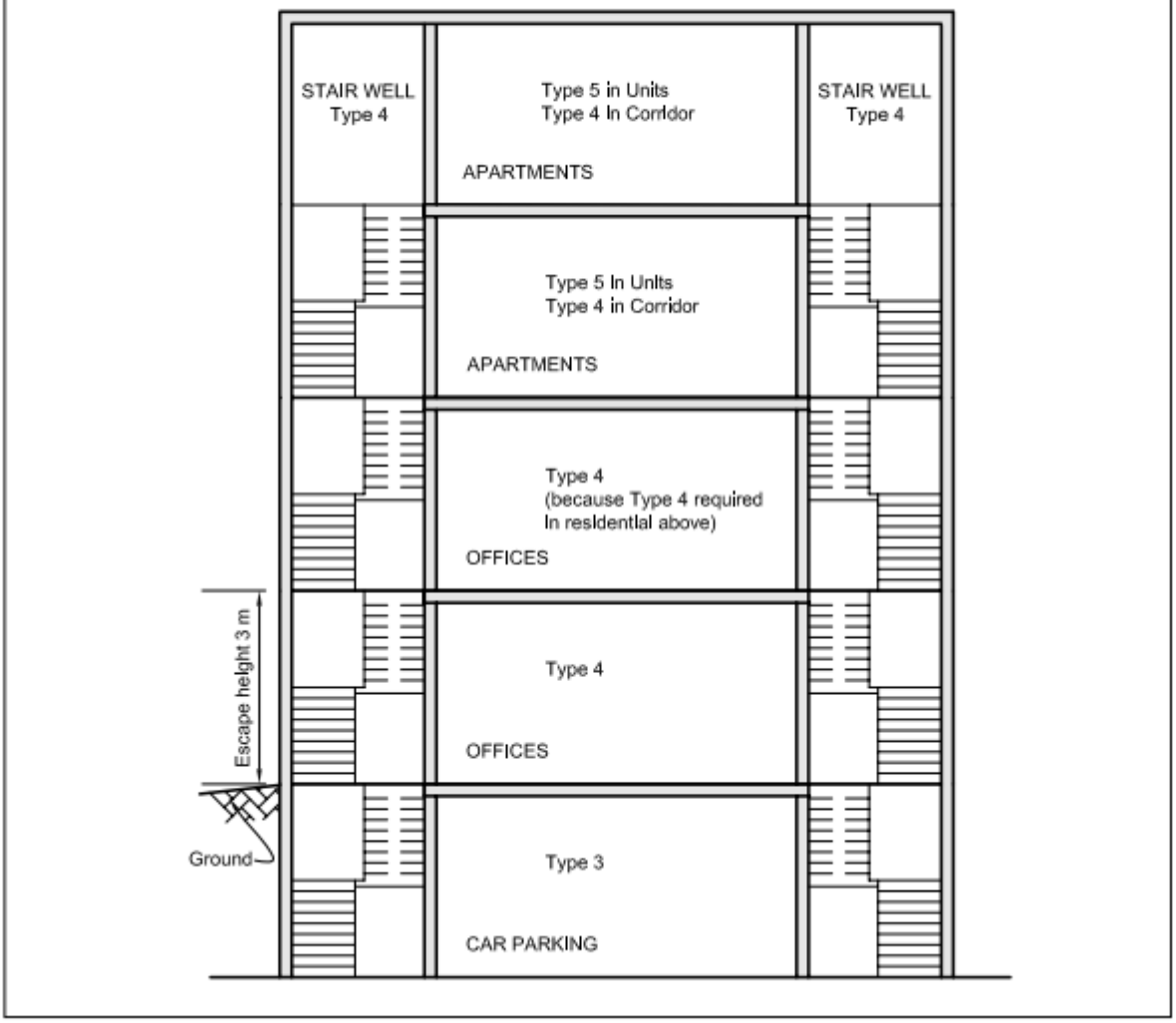
| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| *unit* above another), and where each *household unit* has its own *escape route* that is independent of all other *household units*, stand-alone houses, attached townhouses. Detached dwellings where five or fewer people (not including members of the residing family) pay for accommodation, such as boarding houses/homestays/bed and breakfast. Outbuildings. | **Low-rise *multi-unit dwellings* where each *household unit* has its own *escape route* that is independent of all other *household units* such as:** stacked *household units* where there is no more than one *household unit* above another and the *escape height* is less than 4.0 m, attached townhouses<br>**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<br>**Outbuildings.** | proposed scope of risk group SH in C/AS1. |
| **Table 1.1 Risk groups: scope and limitations**<br>**SM**<br>**Permanent accommodation such as:** Apartment buildings and other buildings which consist of more than one household unit (other than low rise multi-unit dwellings).<br>**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.<br>**Educational accommodation such as:** University halls of | **Table 1.1 Risk groups: scope and limitations**<br>**SM**<br>**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**).<br>**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.<br>**Educational accommodation such as:** University halls of | **C/AS2 Item 1: Scope of risk groups**<br>The description of this risk group is proposed to be amended to align with the new proposed scope of risk group SH in C/AS1. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| residence, school boarding hostels etc. | residence, school boarding hostels etc. | |
| **Table 1.1 Risk groups: scope and limitations**<br>**WB**<br>**Storage activities such as:** *Buildings* or part 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 no more than 5.0 m in height, 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. | **Table 1.1 Risk groups: scope and limitations**<br>**WB**<br>**Storage activities such as:** *Buildings* or part 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. | **C/AS2 Item 8: Errata from 2019**<br>This text was amended as part of errata issued on 31 October 2019. The word "no" was previously included in the text as a typo. It is proposed to keep the text as amended. |
| **Scope 1.1.1**<br>...<br>[no icon] f) Park vehicles (VP)<br>VP These activities are described in Table 1.1... | **Scope 1.1.1**<br>...<br>VP f) Park vehicles (VP)<br>[no icon] These activities are described in Table 1.1... | **C/AS2 Item 7: Editorial**<br>The risk group VP icon is proposed to move one line higher to sit next to Paragraph 1.1.1 f). |
| **1.1.6**<br>This Acceptable Solution does not provide for any use, storage or processing of hazardous substances. Compliance with F3/VM1, the Hazardous Substances and New Organisms Act 1996, and the Health and Safety at Work (Hazardous Substances) Regulations 2017 shall also be ensured where applicable in addition to the requirements of this Acceptable Solution. | **1.1.6**<br>This Acceptable Solution does not provide for any use, storage or processing of hazardous substances. Compliance with NZBC Clause F3, the Hazardous Substances and New Organisms Act 1996, and the Health and Safety at Work (Hazardous Substances) Regulations 2017 shall also be ensured where applicable in addition to the requirements of this Acceptable Solution. | **C/AS2 Item 7: Editorial**<br>Reference to the NZBC clause F3 is proposed rather than reference to F3/VM1. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/AS2 Part 2 Firecells, fire safety systems and fire resistance ratings** | | |
| **Additional requirements for early childhood centres**<br>**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:<br>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.<br>b) Where the *escape height* of the *early childhood centre* is greater than 2.0 m, a Type 7 system shall be installed throughout the *building*.<br>c) If the *early childhood centre* is not located on the ground floor at least two separate *places of safety* shall be provided. 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**<br>**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:<br>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.<br>b) Where the *escape height* of the *early childhood centre* is greater than 2.0 m:<br>i) a Type 7 system shall be installed throughout the *building*, and<br>ii) at least two separate *places of safety* shall be provided, and<br>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*. | **C/AS2 Item 7: Editorial**<br>This proposal amends the text to replace 'ground floor' with a escape height limit of 2 m before places of safety are required. This change is consistent with the wording of the requirement in Paragraph 2.2.1 b) and is also consistent with a comment box C/AS4 Amendment 4 2017 which previously clarified that an escape height of 2.0 m permitted configurations slightly above or below the ground floor (such as on a sloping site where there is a small set of stairs up or down). |
| **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).<br>…<br>**Figure 2.1 Fire safety systems throughout a building**<br>[Refer to Figure 2.1 on the next page] | **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*.<br>…<br>Delete | **C/AS2 Item 7: Editorial**<br>This proposal removes Figure 2.1 and the reference to the figure. The applicable requirements for buildings with multiple firecells are provided in Table 2.4 and the figure is not expected to provide added clarification of the requirements. |

## Current C/AS2 Figure 2.1 Fire safety systems throughout a building [To be removed]

**Figure 2.1** **Fire safety systems throughout a building**
Paragraph 2.2.3



| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Tables 2.2a Note 4, Table 2.2b Note 6, Table 2.2c Note 7, Table 2.2d Note 4**<br>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 hose run distance to any point on any floor is less than 75 m, as measured from Fire and Emergency New Zealand vehicular access. | **Tables 2.2a Note 4, Table 2.2b Note 6, Table 2.2c Note 7, Table 2.2d Note 4**<br>Where the hose run distance from the *hard-standing* to any point within the *building* is more than 75 m as determined in accordance with Paragraph 6.3.1, or where the height from the *hard-standing* to any floor is more than 15 m, *building* hydrants shall be provided that meet the requirements of NZS 4510. | **C/AS2 Item 6: Firefighting**<br>This proposal amends the text to clarify when a Type 18 system is required in a building based on the hose run. The method to determine the hose run is proposed in Paragraph 6.3.1. |
| **Table 2.2b Minimum fire safety systems by type required for crowd uses, risk group CA[1]**<br>Occupant load 251 to ≤ 1000, Escape height (metres) ≥ 4 to < 10: 4[4,5], 18[6] | **Table 2.2b Minimum fire safety systems by type required for crowd uses, risk group CA[1]**<br>Occupant load 251 to ≤ 1000, Escape height (metres) ≥ 4 to < 10: 4[4,5], 9, 18[6] | **C/AS2 Item 8: Errata from 2019**<br>This text was amended as part of errata issued on 31 October 2019. The requirement for a Type 9 system for an occupant load of 251 to ≤ 1000 and an escape height (metre) ≥ 4 to < 10 was not included as a typo. It is proposed to keep the text as amended. |
| **Table 2.2c Minimum fire safety systems by type required for crowd uses, risk group WB and WS**<br>Occupant load 100 to 250 & 251 to ≤ 1000, Escape height (metres): 0 & < 4: 4[5,6],18[7] | **Table 2.2c Minimum fire safety systems by type required for crowd uses, risk group WB and WS**<br>Occupant load 100 to 250 & 251 to ≤ 1000, Escape height (metres): 0 & < 4: 4[4,5,6],18[7] | **C/AS2 Item 8: Errata from 2019**<br>This text was amended as part of errata issued on 31 October 2019. With the development of the new table in C/AS2 First Edition 2019, a key table note was erroneously left out of four fields. Table note 4 contains the requirement: "Where the environment is challenging for smoke detection, the Type 4 system may be substituted with a Type 3 system with supplementary smoke detection". Each of the four entries should read: 4[4,5,6], 18[7] ·It is proposed to keep the text as amended. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **2.3.13** *Insulation* ratings are not required to apply to:<br>a) Glazing installed in accordance with Paragraph 4.2, or<br>b) Elements where sprinklers are installed throughout the *building*, in accordance with either NZS 4541 or NZS 4515 as appropriate, or<br>c) *Fire* stops in accordance with Paragraph 4.4.5, or<br>d) *Fire* dampers and damper blades in accordance with Paragraph 4.16.12, or<br>e) *Fire resisting glazing* in accordance with Paragraph 5.4.3. | **2.3.13** *Insulation* ratings are not required to apply to:<br>a) Glazing that is exempt in accordance with Paragraph 4.15.10, or<br>b) Elements where sprinklers are installed throughout the *building*, in accordance with either NZS 4541 or NZS 4515 as appropriate, or<br>c) *Fire* stops in accordance with Paragraph 4.3.5, or<br>d) *Fire* dampers and damper blades in accordance with Paragraph 4.15.16, or<br>e) *Fire resisting glazing* in accordance with Paragraph 5.4.2. | **C/AS2 Item 7: Editorial**<br>a) is reworded for clarity<br>Paragraph numbers have changed, references have been updated. |
| **Table 2.4 Life and property ratings in minutes**<br>(Colum 1, row 2) Risk group: left align | **Table 2.4 Life and property ratings in minutes**<br>(Colum 1, row 2) Risk group: centre align | **C/AS2 Item 7: Editorial**<br>It is proposed to format the alignment of the subheading "Risk group" to maintain consistent formatting in the document. |
| **C/AS2 Part 3 Means of escape** | | |
| **3.1.4** Escape routes shall comply with NZBC D1. Ramps, stairs, ladders, landings, handrails, doors, vision panels and openings shall comply with Acceptable Solution D1/AS1. | **3.1.4** *Escape routes* shall comply with NZBC Clause D1. Where stairs or ladders are not used, changes in level in an escape route shall be formed as ramps. | **C/AS2 Item 2: Means of escape**<br>It is proposed to remove requirements from Paragraph 3.1.4 that are found in NZBC Clause D1 to remove repeated requirements between the clauses. Additionally, text from Paragraph 3.7.1 is proposed to be located here as the requirement for ramps affects all escape routes and not just open paths. |
| **Table 3.1a Minimum clear width of escape routes, excluding ladders (mm)** | **Table 3.1a Minimum clear width of escape routes, excluding ladders (mm)**<br>**Table 3.1b Minimum clear width of doors on escape routes(mm)** | **C/AS2 Item 2: Means of escape**<br>This proposal splits the table into two parts separated by elements (escape routes versus doors) and adds |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | [Refer to proposed tables below] | additional table notes to reflect requirements in other paragraphs. The paragraph references are proposed to be amended as the paragraphs are proposed to be renumbered. |

## Proposed C/AS2 Table 3.1a

| Table 3.1a | Minimum clear width of escape routes, excluding ladders (mm)<br>Paragraph 3.3.2 | | | |
|---|---|---|---|---|
| Risk group | Open path[1] | | Exitway | |
| | Horizontal | Vertical | Horizontal | Vertical |
| SM | 850 | 1000 | 1000 | 1000 |
| SI | 850[2] | 1000 | 1200 | 1500 |
| CA WB WS VP | 850 | 1000 | 1000 | 1000 |

**Notes:**

1. *Escape route* widths may be reduced for single *escape routes* as permitted by Paragraph 3.3.2 c) ii).
2. Refer to Paragraphs 3.15.3 a) and f) where the movement of beds is required.

## Proposed C/AS2 Table 3.1b

| Table 3.1b | Minimum clear width of doors on escape routes (mm)<br>Paragraph 3.15.3 | | | |
|---|---|---|---|---|
| Risk group | Open path[1] | | Exitway | |
| | Horizontal | Vertical | Horizontal | Vertical |
| SM | 760 | 760 | 875 | 875 |
| SI | 760[2] | 760 | 950[2] | 1200 |
| CA WB WS VP | 760 | 760 | 875 | 875 |

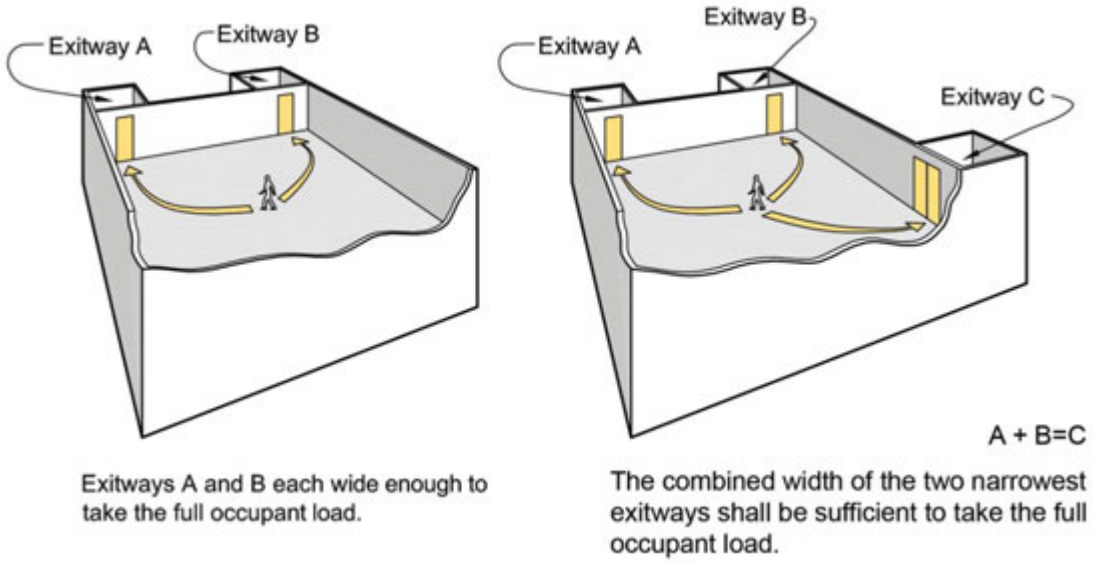
**Notes:**

1. Refer to Paragraph 3.15.3 a) for additional requirements. Multi-leaf doors shall not have a single leaf less than 500 mm wide. The minimum door opening width may be reduced to 600 mm if it is not required to be an *accessible route*.
2. Refer to Paragraphs 3.15.3 a) and f) where the movement of beds is required.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **3.3.1** Height requirements within *escape routes* shall be as follows:<br>a) The clear height shall be no less than that required by D1/AS1, and<br>... | **3.3.1** Height requirements within *escape routes* shall be as follows:<br>a) The clear height shall be no less than that required by NZBC Clause D1, and<br>... | **C/AS2 Item 7: Editorial**<br>It is proposed to reference the Building Code Clause D1 and not D1/AS1 in order to allow for more options to demonstrate compliance. |
| **3.3.5** If curved or spiral stairs form part of an *escape route*, the required width shall be that described as 'walking area' in Acceptable Solution D1/AS1. | **3.3.5** Where curved or spiral stairs form part of an escape route, the required width of such stairs is to be measured across the tread where the tread depth meets the requirements for the tread depth in NZBC Clause D1. | **C/AS2 Item 2: Means of escape**<br>It is proposed to amend the word to clarify how to determine the minimum required width for a spiral staircase. |
| **Figure 3.3 Exitway widths in unsprinklered firecells**<br><br>8 m | **Figure 3.3 Exitway widths in unsprinklered firecells**<br><br>Delete<br>[Refer to the proposed figure on the next page] | **C/AS2 Item 7: Editorial**<br>This proposal removes the 8 m distance between exitways shown in the figure as these dimensions are not relevant to the referenced Paragraph 3.3.2 d). |
| **Figure 3.5 Escape routes from lower and upper floors**<br>A<br>B<br>A+B<br>[Refer to the current figure on the following pages] | **Figure 3.5 Escape routes from lower and upper floors**<br>Delete<br>Delete<br>Delete<br>[Refer to the proposed figure on the following pages] | **C/AS2 Item 7: Editorial**<br>This proposal amends the figure to remove the letters 'A' 'B' and 'A+B' as they may lead to an incorrect interpretation of the requirement. In some cases, the width determined by the occupant load from above or below may be less than the minimum required width of these segments. Thus, in some cases, the combined width 'A+B' would be overly onerous. The correct interpretation of the requirement is provided in Paragraph 3.3.2 k). |

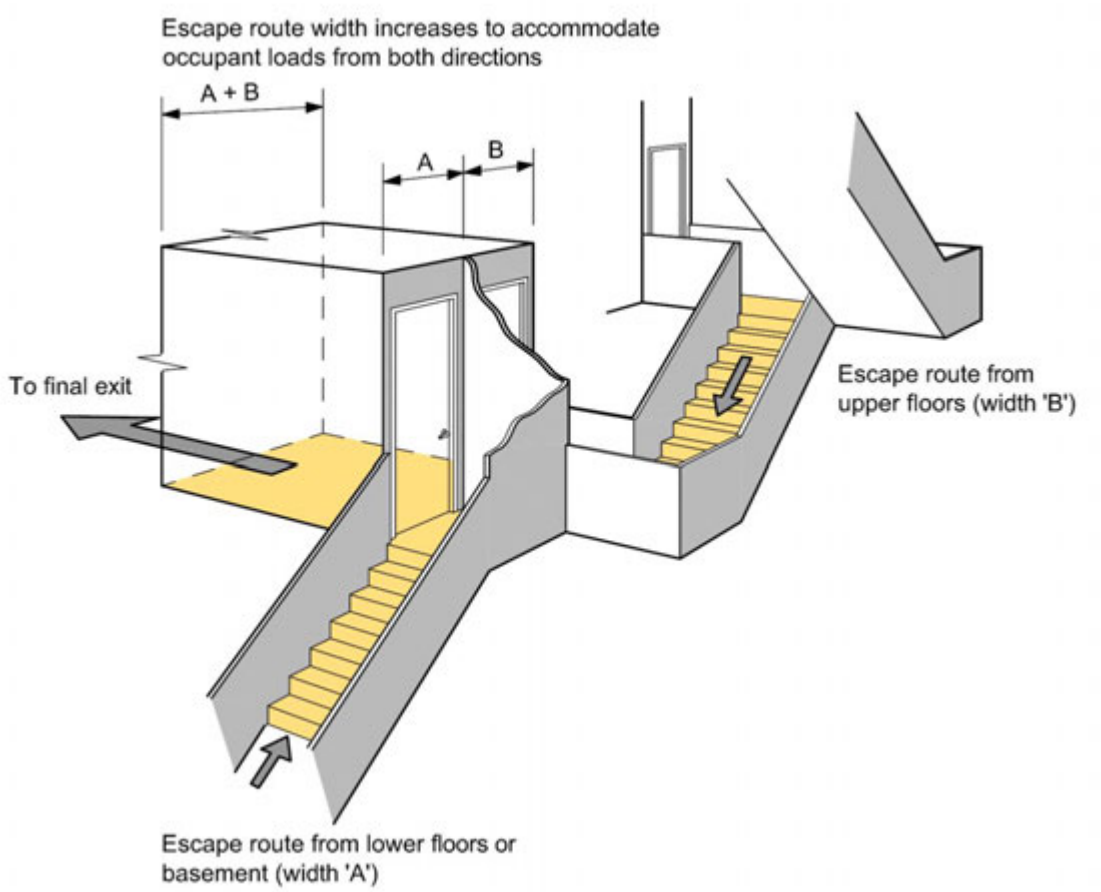
## Proposed C/AS2 Figure 3.3 Exitway widths in unsprinklered firecells

**Figure 3.3** **Exit widths in unsprinklered firecells**
Paragraph 3.3.2 d)



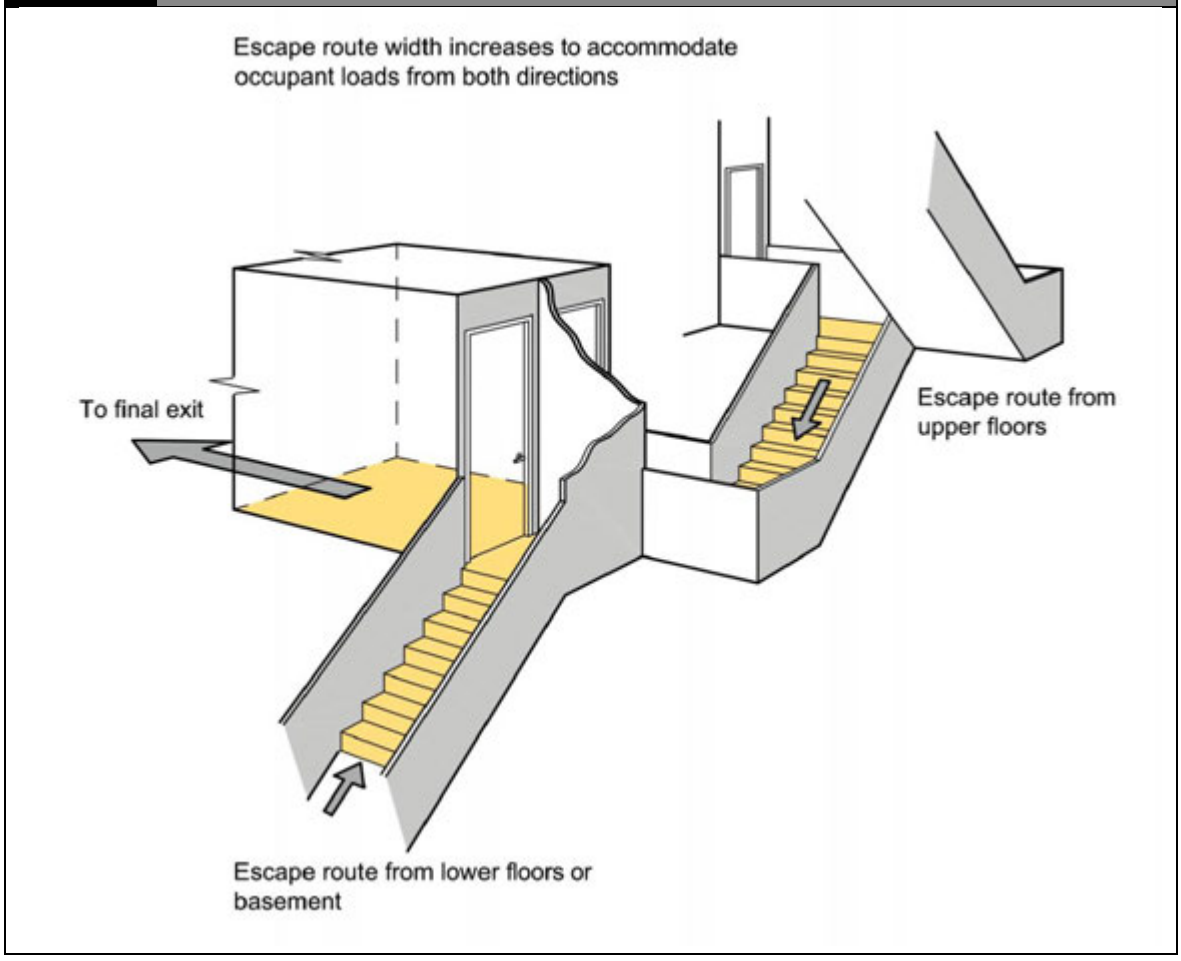
## Current C/AS2 Figure 3.5 Escape routes from lower and upper floors

**Figure 3.5** **Escape routes from lower and upper floors**
Paragraph 3.3.2 k)



## Proposed C/AS2 Figure 3.5 Escape routes from lower and upper floors

**Figure 3.5** **Exit routes from lower and upper floors**
Paragraph 3.3.2 k)



| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Obstructions**<br>**3.3.6** Except as permitted by Paragraph 3.15.7, escape routes shall not be obstructed by access control systems.<br>The following minor obstructions are acceptable within the width of an escape route:<br>a) Minor projections complying with the requirements of Acceptable Solution D1/AS1 such as signs, switches, alarm sounders and similar projections, and<br>b) Handrails complying with Acceptable Solution D1/AS1 and projecting no more than 100 mm into the width, and handrails subdividing wide stairways that reduce the width by no more than 100 mm (see Paragraph 3.3.3), and<br>c) Door assemblies which reduce the width of an exitway by no more than 125 mm when the door is fully open (see Figure 3.23), or as permitted by Table 3.1a, and<br>d) In risk group CA fixed seating (at the start of an escape route) which complies with the requirements of Paragraph 3.7.4 and Table 3.3 for the width of aisles and space between rows. | **Obstructions**<br>**3.3.6** The following minor obstructions are acceptable within the width of an *escape route:*<br>a) Minor projections complying with the requirements of NZBC Clause D1 such as signs, switches, alarm sounders and similar projections, and<br>b) Handrails complying with NZBC Clause D1 and projecting no more than 100 mm into the width, and handrails subdividing wide stairways that reduce the width by no more than 100 mm (see Paragraph 3.3.3), and<br>c) Door assemblies which reduce the width of an *exitway* by no more than 125 mm when the door is fully open (see Figure 3.23), or as permitted by Table 3.1a, and<br>d) In *risk group* CA fixed seating (at the start of an escape route) which complies with the requirements of Paragraph 3.7.4 and Table 3.3 for the width of aisles and space between rows.<br>3.3.7 Except as permitted by Paragraph 3.15.7, *escape routes* may not be obstructed by access control systems. | **C/AS2 Item 7: Editorial**<br>This proposal creates a new Paragraph 3.3.7 as the first and second sections of the current Paragraph 3.3.6 discuss different aspects for obstructions.<br>It is also proposed to reference NZBC Clause D1 to allow for more options to demonstrate compliance. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **3.4.1** An *escape route* may be any length, but:<br>a) The lengths of *dead ends* and total *open paths* shall not exceed the distances given in Table 3.2, adjusted as necessary for:<br>i) reductions on *intermediate floors* (see Paragraph 3.4.3), apart from vehicle parking *buildings* with adequate cross ventilation in accordance with Paragraph 4.1.3, and<br>ii) reductions on stairs and ladders (see Paragraph 3.4.4), and<br>b) … | **3.4.1** An *escape route* may be any length, but:<br>a) The lengths of *dead ends* and total *open paths* shall not exceed the distances given in Table 3.2, adjusted as necessary for:<br>i) reductions on *intermediate floors* (see Paragraph 3.4.3), apart from ***risk group* VP** *firecells* with adequate cross ventilation in accordance with Paragraph 4.1.3 , and<br>ii) reductions on stairs and ladders (see Paragraph 3.4.4), and<br>b) … | **C/AS2 Item 7: Editorial**<br>This proposal amends the text to use the term “risk group VP firecell” to maintain consistent terminology and interpretations throughout the document. |
| **Table 3.2 Travel distances on open paths (metres)**<br><br>**Heading, 2nd row, 2nd column:**<br>No system and Type 2 system<br><br>**Notes:**<br>If *open path* length increases for a Type 4 system are being applied, where Acceptable Solution F7/AS1 allows heat detectors to be substituted for smoke detectors, not less than 70% of the firecell shall be protected with smoke detectors.<br>If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire and Emergency New Zealand connection is not required.<br>*Type 5 system only for *risk group* SM | **Table 3.2 Travel distances on open paths (metres)**<br><br>**Heading, 2nd row, 2nd column:**<br>No system, Type 1* and/or Type 2 system<br><br>**Notes:**<br>If *open path* length increases for a Type 4 system are being applied, any substitution of smoke detectors with heat detectors must comply with the requirements of NZS 4512 Clause 405.1.3.<br><br>If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then a direct connection to a *remote receiving centre* is not required. | **C/AS2 Item 7:**<br>This proposal amends the table to include Type 1 to address situations where risk group SM may only have a Type 1 system installed. Additionally, it is proposed to amend the notes to replace the reference to F7/AS1 with a reference to NZS 4512 which contains the appropriate requirement. The term “remote receiving centre" is proposed to align with NZS 4512 text and the other proposed changes to the document. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | *Type 1 and Type 5 system only for ***risk group* SM**<br><br>[Refer to proposed table below] | |

## Proposed C/AS2 Table 3.2 Travel distances on open paths (metres)

**Table 3.2** Travel distances on open paths (metres)
Paragraph 3.4

| Risk group | No system, Type 1 and/or Type 2 system | | Type 3 system | | Type 4 and Type 5* systems | | Type 6 system | | Type 7 system | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dead end open path | Total open path | Dead end open path | Total open path | Dead end open path | Total open path | Dead end open path | Total open path | Dead end open path | Total open path |
| SM | 20 | 50 | | | 30 | 75 | 30 | 75 | 40 | 100 |
| SI | | | | | | | | | 20 | 50 |
| CA | 20 | 50 | 20 | 50 | 40 | 100 | 40 | 100 | 50 | 120 |
| WB | 25 | 60 | 35 | 75 | 50 | 120 | 50 | 120 | 75 | 150 |
| WS | | | | | | | 50 | 120 | 75 | 180 |
| VP | 35 | 90 | 45 | 110 | | | 70 | 180 | | |

**Notes:**

If *open path* length increases for a Type 4 system are being applied, any substitution of smoke detectors with heat detectors must comply with the requirements of NZS 4512 Clause 405.1.3.

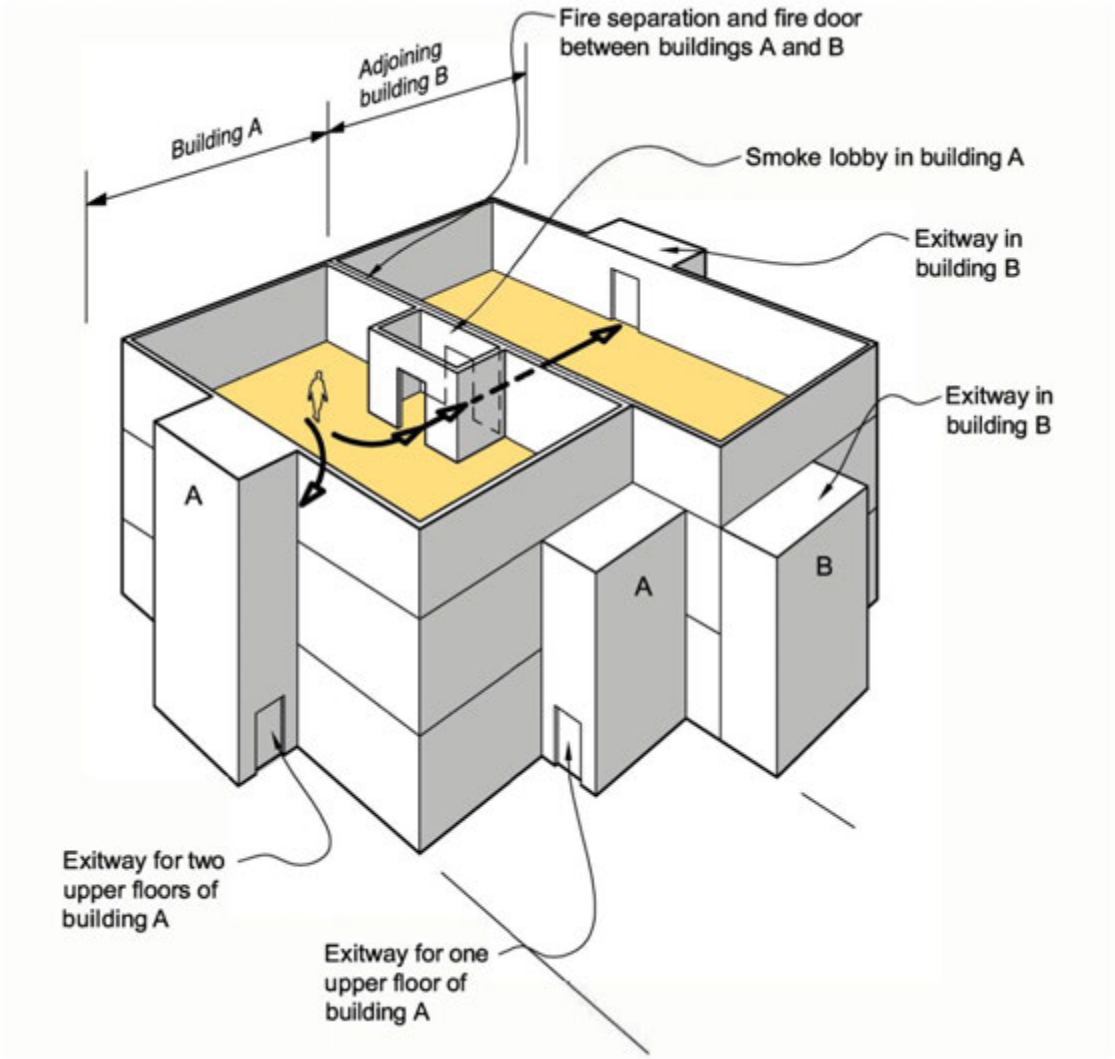
If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then a direct connection to a *remote receiving centre* is not required.

* Type 1 and 5 system only for ***risk group* SM**.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Figure 3.10 Escape through adjoining building**<br>Paragraphs 3.4.6 and 4.16.9 c) | **Figure 3.10 Escape through adjoining building**<br>Paragraphs 3.4.6 and 4.15.8 c)<br><br>[Refer to proposed figure on the next page] | **C/AS2 Item 7: Editorial**<br>This proposal amends the paragraph reference as paragraph numbers are proposed to be change and amends the figure to colour a portion of the illustration where the floor was left white. |
| **Figure 3.11 Single escape from basement levels**<br>Paragraphs 3.5.1 and 3.13.1 e)<br><br>Smoke lobby entry to safe path from basement levels | **Figure 3.11 Single escape from basement levels**<br>Paragraphs 3.5.1 and 3.13.1 d)<br><br>*Smoke lobby* preceding *safe path* from *basement* levels<br><br>[Refer to proposed figure on following pages] | **C/AS2 Item 7: Editorial**<br>This proposal amends the paragraph reference in this figure and amends the wording to align with text in Paragraph 3.5.1. |
| **Figure 3.12 Alternative open path separation**<br>Less than 8.0 m | **Figure 3.12 Alternative open path separation**<br>[Remove "less than 8.0 m"]<br><br>[Refer to proposed figure on following pages] | **C/AS2 Item 7: Editorial**<br>This proposal removes "less than 8.0 m" and the dimensioning lines at the bottom of the figure as these are not relevant for interpretation of the figure. |
| **Exception for education buildings**<br>**3.6.3** If a *building* houses classrooms, laboratories and/or spaces used for home economics, art and crafts, workshops or similar teaching activities… | **Exception for education buildings**<br>CA **3.6.3** If a *building* houses classrooms, laboratories and/or spaces used for home economics, art and crafts, workshops or similar teaching activities… | **C/AS2 Item 7: Editorial**<br>This proposal adds the CA risk group icon to this paragraph as the requirement applies to schools within the scope of risk group CA. |

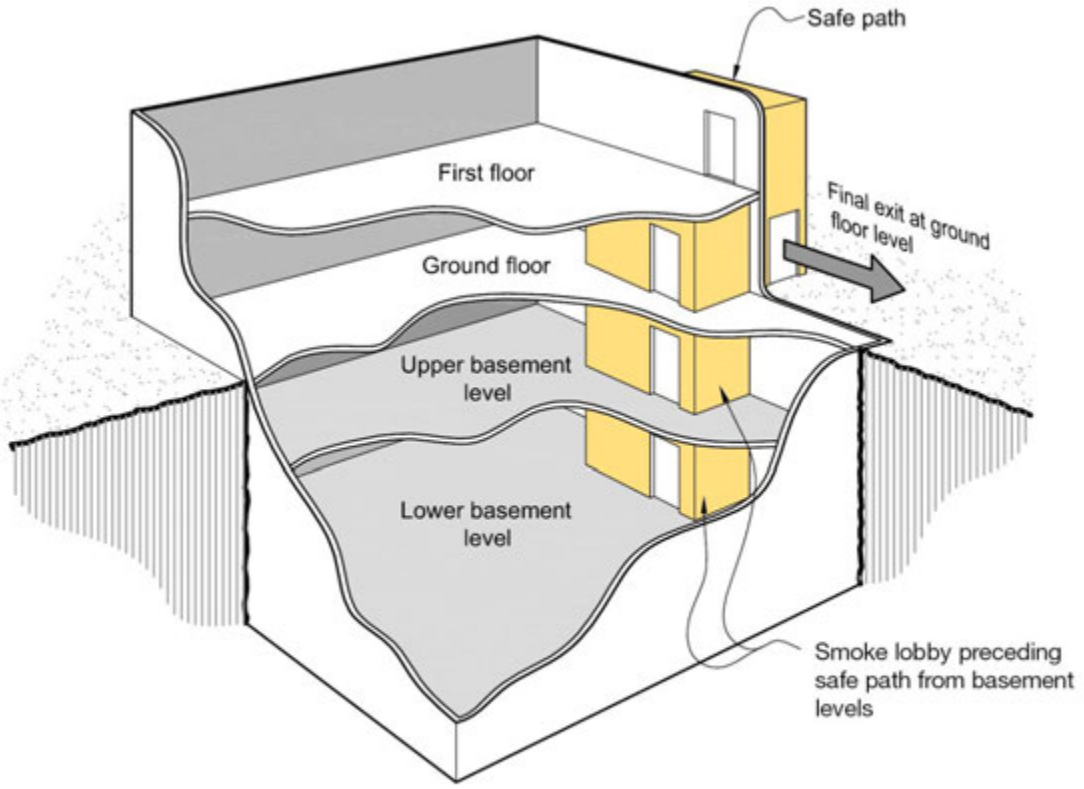
## Proposed C/AS2 Figure 3.10 Escape through adjoining building

**Figure 3.10** **Escape through adjoining building**
Paragraph 3.4.6 and 4.15.8 c)



## Proposed C/AS2 Figure 3.11 Single escape from basement levels

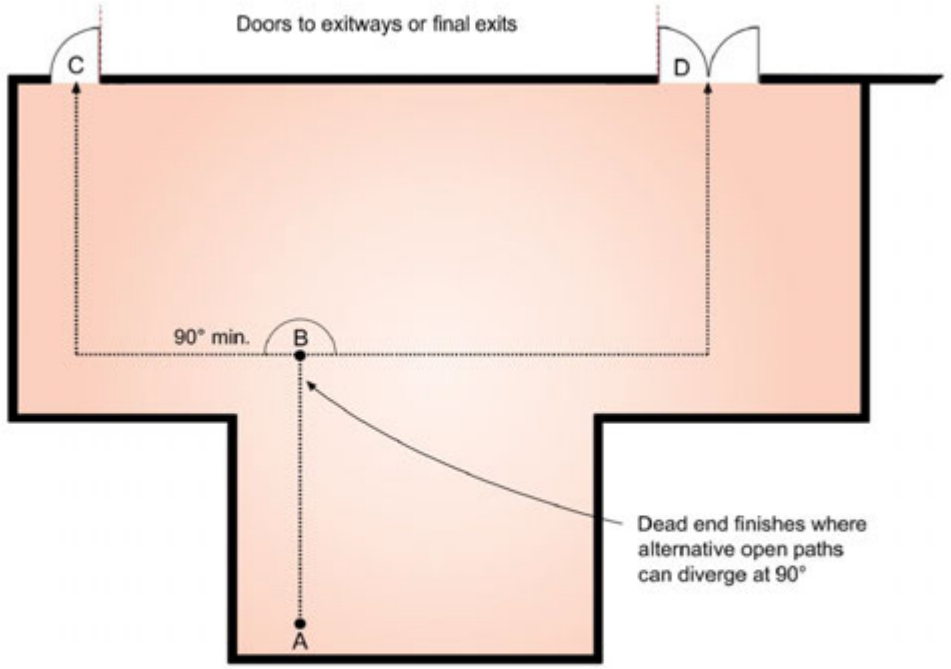
**Figure 3.11** **Single escape from basement levels**
Paragraph 3.5.1 and 3.13.1 d)




NOTES:
1. Occupant load at each basement level no greater than 50
2. A single *escape route* is permitted only when there are no more than two basement levels

## Proposed C/AS2 Figure 3.12 Alternative open path separation

**Figure 3.12** **Alternative open path separation**
Paragraph 3.6.2




Alternative open paths must continue at minimum of 90° divergence until separated by at least 8.0 m.

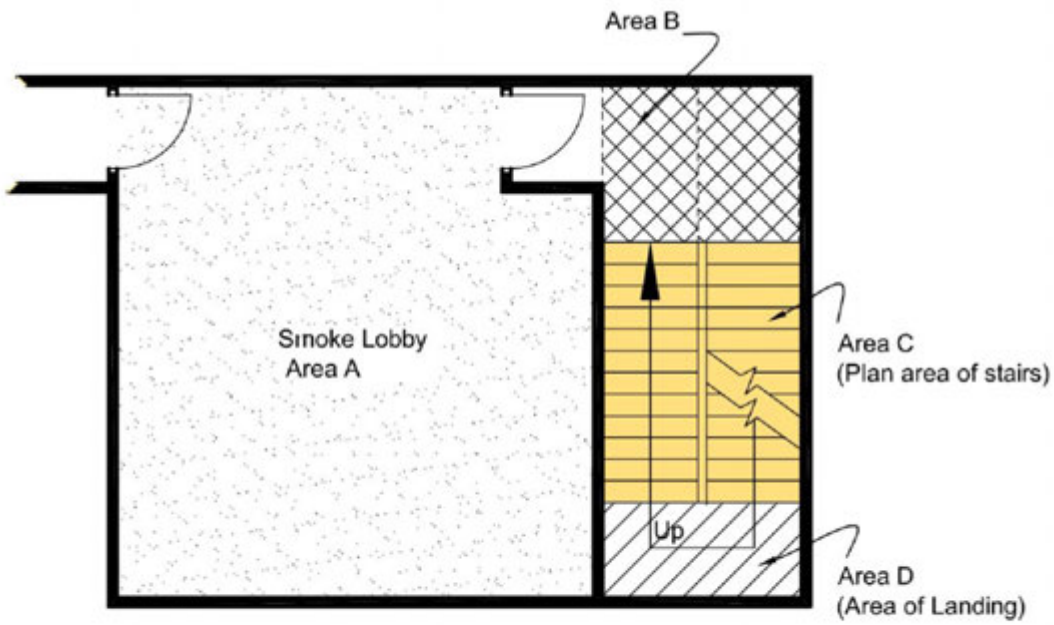
Path ABC = less than total open path
Path ABD = less than total open path

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **3.7 Special cases of open paths**<br>**Ramps**<br>**3.7.1** Where stairs are not used, changes in level on an *escape route* shall be formed as ramps and shall comply with Acceptable Solution D1/AS1.<br>**Separate tenancy**<br>**3.7.2** … | **3.7 Special cases of open paths**<br>**Separate tenancy**<br>**3.7.1** … | **C/AS2 Item 2: Means of escape**<br>Paragraph 3.7.1 is proposed to move to Paragraph 3.1.4 as the requirements for ramps are applicable to all portions of an escape route and not just the portions in an open path. |
| **3.7.13** If an *open path* passes through a number of *fire separations* it is permitted to continue as the same *open path* provided the cumulative *travel distance* does not exceed the permitted distance specified in Table 3.2. | **3.7.1** If an *escape route* passes through a number of *fire separations* it is permitted to continue as an *open path* provided the cumulative *travel distance* does not exceed the permitted distance specified in Table 3.2. | **C/AS2 Item 2: Means of escape**<br>By definition as well as Paragraphs 3.4.1. b) and 3.4.2. f) iii) an open path ends where it passes through a fire separation |
| **3.7.1**<br>**3.7.2**<br>**3.7.3**<br>**3.7.4**<br>**3.7.5**<br>… the layout shall follow the requirements of Paragraphs<br>**3.7.7 to 3.7.12**<br>**3.7.6**<br>**3.7.7**<br>... a) Aisle widths as required by Paragraph 3.7.8, or<br>3.7.8<br>3.7.9<br>3.7.10<br>3.7.11<br>Any side of an aisle that does not provide access to seating shall have barriers complying with Acceptable Solution F4/AS1 and *handrails* complying with Acceptable Solution D1/AS1.<br>**3.7.12** Steps in aisles shall have consistent riser heights and tread depths, both complying with the requirements of | **3.7.1** moved text to **3.1.4**<br>**3.7.2** now **3.7.3**<br>**3.7.3** now **3.7.5**<br>**3.7.4** now **3.7.6**<br>**3.7.5** now **3.7.7**<br>…The layout shall follow the requirements of Paragraphs<br>**3.7.9 to 3.7.14**<br>**3.7.6** now **3.7.8**<br>**3.7.7** now **3.7.9**<br>... a) Aisle widths as required by Paragraph **3.7.10**, or<br>**3.7.8** now **3.7.10**<br>**3.7.9** now **3.7.11**<br>**3.7.10** now **3.7.12**<br>**3.7.11** now **3.7.13**<br>Any side of an aisle that does not provide access to seating shall have barriers complying with NZBC Clause F4 and *handrails* complying with NZBC Clause D1.<br><br>**3.7.12** now **3.7.14**<br>Steps in aisles shall have consistent riser heights and tread depths, both complying | **C/AS2 Item 7: Editorial**<br>The paragraphs are proposed to be re-ordered so that the structure goes from the general to the most specific. This is to provide more clarity and easier reading of the requirements. In addition, it is proposed to reference the NZBC Clause F4 and D1 to provide more options to demonstrate compliance.<br><br>The content changes to current Paragraphs 3.7.1 and 3.7.13 are listed separately |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| Acceptable Solution D1/AS1. Landing lengths in aisles ... may be less than the minimum length required by Acceptable Solution D1/AS1.<br>**3.7.13**<br>**3.7.14**<br>**3.7.15** | with the requirements of NZBC Clause D1. Landing lengths in aisles ... may be less than the minimum length required by NZBC Clause D1.<br>**3.7.13** now **3.7.1**<br>**3.7.14** now **3.7.2**<br>**3.7.15** now **3.7.4** | |
| **Figure 3.13 Fixed seating – with backs**<br>Paragraph 3.7.4 d)<br><br>**Figure 3.14 Aisles serving fixed seating**<br>Paragraph 3.7.7<br><br>**Figure 3.15 Open path passing into adjacent firecells**<br>Paragraph 3.7.14 | **Figure 3.13 Fixed seating – with backs**<br>Paragraph 3.7.6 d)<br><br>**Figure 3.14 Aisles serving fixed seating**<br>Paragraph 3.7.9<br><br>**Figure 3.15 Open path passing into adjacent firecells**<br>Paragraph 3.7.2 | **C/AS2 Item 7: Editorial**<br>This proposal amends the paragraph references in these figures as the paragraph numbers are proposed to change. |
| **Figure 3.16 Sizing of smoke lobbies**<br>Area B (stair landing) half covered with grid<br><br>...<br>The size shall be at least that required by D1/AS1 | **Figure 3.16 Sizing of smoke lobbies**<br>Area B (stair landing) half covered with grid<br><br>...<br>The size shall be at least that required by NZBC Clause D1<br><br>[Refer to proposed figure on the following page] | **C/AS2 Item 7: Editorial**<br>This proposal amends the figure by covering the full landing with a hatch pattern to align with the text in Paragraph 3.9.2 b).<br><br>The reference to the NZBC Code Clause D1 is also amended in order to provide more options to demonstrate compliance. |
| **3.8 Dead Ends**<br>**No more than 50 occupants**<br>**3.8.1** A *dead end* shall not serve an *occupant load* greater than 50. | **3.8 Dead Ends**<br>**3.8.1** 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*.<br>**No more than 50 occupants**<br>**3.8.2** A *dead end* shall not serve an *occupant load* greater than 50. | **C/AS2 Item 7: Editorial**<br>It is proposed to move text from the defined term 'dead end' and create a new Paragraph 3.8.1 to capture this text as a normative requirement. |

## Proposed C/AS2 Figure 3.16

**Figure 3.16** **Sizing of smoke lobbies**
Paragraph 3.9.2




Size of smoke lobby (Area A) required =
Number of persons to be accommodated x 0.25 minus (Area B + Area C + Area D)
The size shall be at least that required by NZBC Clause D1

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **3.8.2** For all risk groups ...<br><br>... may be a ladder complying with Acceptable Solution D1/AS1 if it serves ... | **3.8.3** For all risk groups ...<br><br>... may be a ladder complying with NZBC Clause D1 if it serves ... | **C/AS2 Item 7: Editorial**<br>This proposal is to renumber the paragraph as the new Paragraph 3.8.1 has been added and reference NZBC Clause D1 to provide more options to demonstrate compliance. |
| **3.9.1** *Exitways* consist of *smoke lobbies* and *safe paths*. | **3.9.1** *Exitways* consist of *smoke lobbies* and/or *safe paths*. | **C/AS2 Item 7: Editorial**<br>This proposal is to amend the text because there is no requirement for an exitway to have both features. |
| **3.9.6** Except where the conditions for escape via an external *escape route* (see Paragraph 3.11) or successive *open paths* (see Paragraphs 3.7.13 and 3.7.14) apply, exit doors from sleeping area *firecells* shall open directly onto:<br>a) A horizontal *safe path*, or<br>b) A *final exit*. | **3.9.6** Except where the conditions for escape via an external *escape route* (see Paragraph 3.11) or successive *open paths* (see Paragraphs 3.7.1 and 3.7.2) apply, exit doors from sleeping area *firecells* shall open directly onto:<br>a) A horizontal *safe path*, or<br>b) A *final exit.* | **C/AS2 Item 7: Editorial**<br>The paragraph references are proposed to be amended because Paragraphs 3.7.13 and 3.7.14 are proposed to change. |
| **3.10.2**...<br>b) For *buildings* with *occupant loads* of up to 500, a Type 4 or 5 system is installed, and for *occupant loads* exceeding 500 a Type 7 system is installed. These systems shall be installed in the *exitway* and connected to alerting devices throughout the *building*, and | **3.10.2**...<br>b) For *buildings*<br>i) with an *occupant load* of not more than 500, where a Type 4 or 5 system is installed, or<br>ii) with an *occupant load* of more than 500 where a Type 7 system is installed, and | **C/AS2 Item 7: Editorial**<br>This proposal is an amendment to the text as the requirements for fire alarm systems and device locations would be already be addresses as part of compliance with NZS 4512. Restating the requirement for devices in exitways here is redundant. |
| **Lifts**<br>**3.10.3** A passenger lift, but not a goods lift, may be located in a vertical *safe path* containing a *stairway* provided the following<br>conditions are satisfied: | **Lifts**<br>**3.10.3** Lift landings in *buildings* must either:<br>a) be in a *building* protected with a Type 7 system, or<br>b) serve a lift of which the lift shaft is fitted with a pressurisation systems designed to AS/NZS 1688.1, or | **C/AS2 Item 7: Editorial**<br>The proposal combines duplicated content in Paragraphs 3.10.4 and 3.10.5 into the new Paragraph 3.10.3. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| a) The lift shaft and all its openings are located entirely within a single *firecell* containing the vertical *safe path*, and<br>b) Passenger access into and from the lift car takes place entirely within the *safe path*, and<br>c) No other activity occurs within the vertical *safe path*, and<br>d) The lift is provided with a machine room that is a separate *firecell*, and the openings for lift ropes through the *fire separation* are as small as practicable, and any *penetrations*, such as for electrical cables, are *fire stopped* (refer to Paragraph 4.4 for *fire stopping*).<br>**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.<br>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* | c) be provided with a *smokecell* which is separated from all other areas including any horizontal *safe paths*, or<br>d) have lift landing doors with smoke control capability.<br><br>The lift doors must be as specified in Paragraphs 4.16.3 and 4.16.11.<br><br>See also Figures 3.17 and 3.18.<br><br>**3.10.4** A passenger lift, but not a goods lift, may be located in a vertical *safe path* containing a *stairway* provided the following conditions are satisfied:<br>a) The lift shaft and all its openings are located entirely within a single *firecell* containing the vertical *safe path*, and<br>b) Passenger access into and from the lift car takes place entirely within the *safe path*, and<br>c) No other activity occurs within the vertical *safe path*, and<br>d) The lift is provided with a machine room that is a separate *firecell*, and the openings for lift ropes through the *fire separation* are as small as practicable, and any *penetrations*, such as for electrical cables, are *fire stopped* (refer to Paragraph 4.3 for *fire stopping*). | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| 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. | | |
| **Table 3.4 Travel distances on horizontal safe paths (metres)**<br><br>**Heading, 2nd row, 2nd column:**<br>No system and Type 2 system<br><br>**Notes:**<br>If *open path* length increases for a Type 4 system are being applied, where Acceptable Solution F7/AS1 allows heat detectors to be substituted for smoke detectors, not less than 70% of the firecell shall be protected with smoke detectors.<br>If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire and Emergency New Zealand connection is not required.<br>*Type 5 system only for *risk group* SM | **Table 3.2 Travel distances on horizontal safe paths (metres)**<br><br>**Heading, 2nd row, 2nd column:**<br>No system, Type 1* and/or Type 2 system<br><br>**Notes:**<br>If *open path* length increases for a Type 4 system are being applied, any substitution of smoke detectors with heat detectors must comply with the requirements of NZS 4512 Clause 405.1.3.<br><br>If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then a direct connection to a *remote receiving centre* is not required.<br><br>*Type 1 and Type 5 system only for ***risk group* SM**<br><br>[Refer to proposed table on following pages] | **C/AS2 Item 7:**<br>This proposal amends the table to include Type 1 to address situations where risk group SM may only have a Type 1 system installed. Additionally, it is proposed to amend the notes to replace the reference to F7/AS1 with a reference to NZS 4512 which contains the appropriate requirement. The term “remote receiving centre" is proposed to align with NZS 4512 text and the other proposed changes to the document. |

## Proposed C/AS2 Table 3.4 Travel distances on horizontal safe paths (metres)

**Table 3.4 Travel distances on horizontal safe paths (metres)**

| Risk group | No system, Type 1 and/or Type 2 system | | Type 3 system | | Type 4 and Type 5 systems | | Type 6 system | | Type 7 system | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Single direction | More than one direction | Single direction | More than one direction | Single direction | More than one direction | Single direction | More than one direction | Single direction | More than one direction |
| SM | 25 | 180 | | | 40 | Unlimited | 40 | Unlimited | 50 | Unlimited |
| SI | | | | | | | | | 20 | 150 |
| CA | 20 | 150 | | | 40 | Unlimited | 40 | Unlimited | 60 | Unlimited |
| WB | 25 | 180 | | | 50 | Unlimited | 50 | Unlimited | 80 | Unlimited |
| WS | | | | | | | 50 | Unlimited | 75 | Unlimited |
| VP | 25 | 180 | 45 | 110 | | | 50 | Unlimited | | |

**Notes:**

If *open path* length increases for a Type 4 system are being applied, any substitution of smoke detectors with heat detectors must comply with the requirements of NZS4512 Clause 405.1.3.

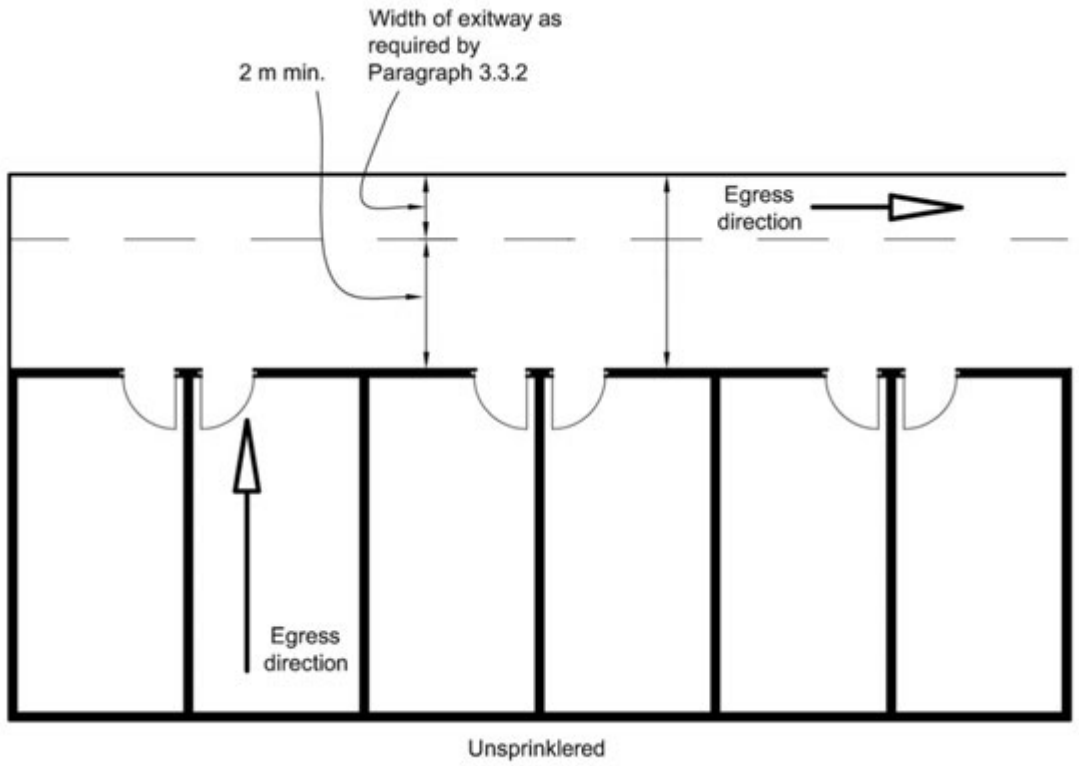
If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then a direct connection to a *remote receiving centre* is not required.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Figure 3.17 Lifts and smoke lobby on open path**<br>Paragraph 3.10.4<br><br>**Figure 3.18 Lifts and smoke separations when landing on an unsprinklered horizontal safe path**<br>Paragraph 3.10.5 | **Figure 3.17 Lifts and smoke lobby on open path**<br>Paragraph 3.10.3<br><br>**Figure 3.18 Lifts and smoke separations when landing on an unsprinklered horizontal safe path**<br>Paragraph 3.10.3 | **C/AS2 Item 7: Editorial**<br>The paragraph references in the heading of the figures are proposed to be amended as the paragraph numbers are proposed to be changed. |
| **3.11.2** …<br>b) The *escape route* shall be located so that it diverges from *external walls* (see Paragraph 3.11.5), or<br>c) Where alternative directions of escape are provided from the point where the *escape* | **Separation by distance**<br>**3.11.2 …**<br>b) The *escape route* shall be located so that it diverges from *external walls* (see Paragraph 3.11.3), or<br>c) Where alternative directions of escape are provided from the point where the *escape* | **C/AS2 Item 7: Editorial**<br>It is proposed to include a a header is added to the subsection to maintain a consistent writing style.<br>It is also proposed to amend references to paragraphs as the paragraph numbers are proposed to be changed. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| *route* passes through an *external wall* and becomes an external *escape route* (refer to Paragraph 3.11.4 b)), *unprotected* areas are permitted. | *route* passes through an *external wall* and becomes an external *escape route* (refer to Paragraph 3.11.3 b)), *unprotected* areas are permitted. | |
| **3.11.3** For ***risk group* SI** if there is only one direction of escape, roofs and external walls shall have no unprotected area closer than 1.0 m to an external escape route. | Deleted | **C/AS2 Item 2:**<br>It is proposed to remove Paragraph 3.11.3 as risk group SI always require sprinklers and this requirement would be addressed in Paragraph 3.11.2. |
| **3.11.4** For …<br><br>**3.11.5** Except where the separation distance requirements of Paragraphs 3.11.2 to 3.11.4 are achieved: …<br><br>**3.11.6** The open area …<br><br>**3.11.7** For ***risk group* CA** | **3.11.3** For …<br><br>**3.11.4** Except where the separation distance requirements of Paragraphs 3.11.2 and 3.11.3 are achieved: …<br><br>**3.11.5** The open area …<br><br>**3.11.6** For ***risk group* CA** | **C/AS2 Item 7:**<br>It is proposed to renumber these paragraphs and references as As Paragraph 3.11.3 is proposed to be removed. |
| **Figure 3.19 External escape routes** | **Figure 3.19 External escape routes**<br><br>[Refer to proposed figure on the next page] | **C/AS2 Item 7:**<br>This proposal is an amendment to clarify figure. The word “unsprinklered” is moved from the external escape route to the building to more accurately indicate what is not sprinklered. One unbroken line on the right of the external escape route is removed to indicate the escape route continues beyond the figure. |

## Proposed C/AS2 Figure 3.19 external escape routes

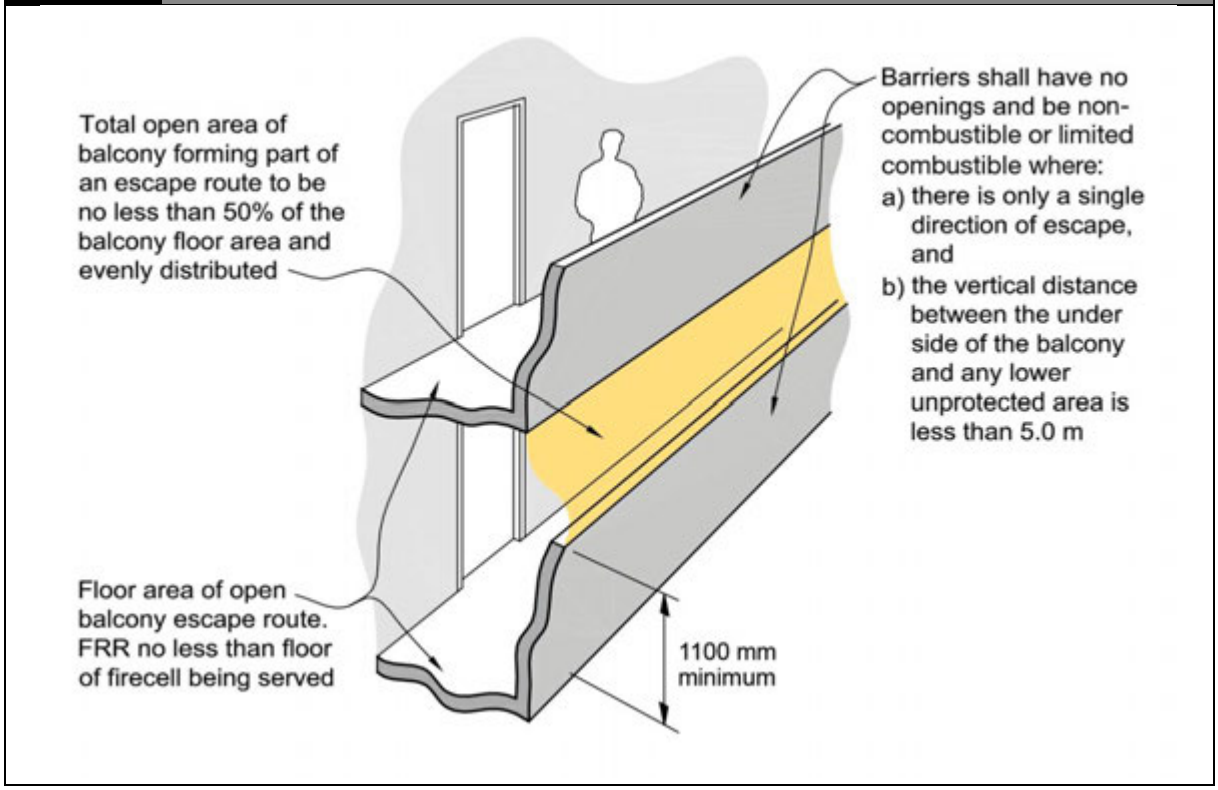
**Figure 3.19** **External escape routes**
Paragraph 3.11.2



| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Figure 3.21 Open balconies**<br>Barriers shall have no openings and be protected by a flame barrier where:<br>a) there is only a single direction of escape and<br>b) the vertical distance between the underside of the balcony and any lower unprotected area is less than 5.0 m | **Figure 3.21 Open balconies**<br>Barriers shall have no openings and be of *non-combustible* or *limited combustible* construction where:<br>a) there is only a single direction of escape, and<br>b) the vertical distance between<br>the underside of the balcony and any lower *unprotected area* is less than 5.0 m | **C/AS2 Item 2: Means of escape**<br>It is proposed to replace the non-defined term 'flame barrier' with the new proposed defined terms 'non-combustible or limited combustible'. |

## Proposed C/AS2 Figure 3.21 Open balconies

**Figure 3.21** **Open balconies**
Paragraphs 3.11.5 and 3.11.6



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|---|---|---|
| **3.13.1** Single *escape routes* shall only be permitted if:<br>a) The *dead end open path* length does not exceed the limits specified in Table 3.2, and<br>b) For all *risk groups* excluding SI the total *occupant load* from all *firecells* on each level served by the *escape route* is no greater than 50, and<br>c) The *escape height* is no greater than:<br>i) 10 m if unsprinklered, or<br>ii) 25 m if sprinklered,<br>d) There are no more than two *basement* levels and the vertical *safe path* from the *basement* levels is preceded by a *smoke lobby* (see Figure 3.11), and<br>e) In *buildings* with two or more floors, the vertical *safe path* is preceded by a *smoke lobby* on all floors except the topmost floor (refer to Paragraph 3.9.2 to determine the *smoke lobby* area). | **3.13.1** Single *escape routes* shall be permitted for all *risk groups* excluding SI if:<br>a) The *dead end open path* length does not exceed the limits specified in Table 3.2, and<br>b) The total *occupant load* from all *firecells* served by the *escape route* is no greater than 50, and<br>c) The *escape height* is no greater than:<br>i) 10 m if unsprinklered, or<br>ii) 25 m if sprinklered, and<br>d) There are no more than two *basement* levels and the vertical *safe path* from the *basement* levels is preceded by a *smoke lobby* (see Figure 3.11), and<br>e) In *buildings* with two or more floors, the vertical *safe path* is preceded by a *smoke lobby* on all floors except the topmost floor (refer to Paragraph 3.9.2 to determine the *smoke lobby* area). | **C/AS2 Item 2: Means of escape**<br>This proposal is to amend the text to ensure consistency of interpretations between Table 3.1 and Paragraph 3.13.1 for the number of escape routes per floors required for SI.<br><br>The proposal also includes the addition of "add" at the end of list entries to ensure that all conditions are met in the application of the requirement. |
| **3.15.1** Except as permitted by Paragraph 3.15.7 (revolving doors, automatic doors and access control systems), doors on *escape routes* shall satisfy the following requirements:<br>a) They shall be hinged or pivoted on one vertical edge only, except that sliding doors may be used where the space, including an *exitway*, has an *occupant load* of less than 20. Roller shutter doors or tilt doors shall not be used as *escape routes* unless they are open at all times the space is occupied. A roller shutter door | **3.15.4** Except as permitted by Paragraph 3.15.7, doors on *escape routes* shall satisfy the following requirements:<br>a) They must be hinged or pivoted on one side only, except that:<br>i) sliding doors, roller shutter doors or tilt doors may be used where the space, including the *exitway*, has an *occupant load* of less than 20, and<br>ii) roller shutter doors and tilt doors must be open at all times the space if occupied, | **C/AS2 Item 2: Means of escape**<br>As roller and tilt doors are difficult to open in a fire emergency, and the restriction to keep the door open at all times is difficult to police, this proposal adds a restriction on the amount of people whose escape from fire may be compromised. |

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| or tilt door is permitted to be the only *access route* to an intermittently *occupied space* where the roller shutter door is open at all times the space is occupied, and | and<br>iii) a roller shutter door or tilt door is permitted to be the only egress from an intermittently *occupied space* where the roller shutter door or tilt door is open at all times the space is occupied. | |
| **3.15.2** Be clearly visible ... that complies with NZBC F8, and ... | **3.15.8** Be clearly visible ... that complies with NZBC Clause F8, and ... | **C/AS2 Item 7: Editorial**<br>The paragraph numbers are proposed to be amended to provide a clearer order for the requirements. It is also proposed to update the reference to NZBC Clause F8 to maintain consistent writing style in the document. |
| **3.15.3** Each door located on an *open path* into an *exitway* shall be hung to open in the direction of escape if the door serves a room or area with more than 50 occupants.<br>Each door located within *exitways* and at *final exits*, and with more than 50 occupants using the door for egress, shall be hung to open in the direction of escape.<br>If escape is in either direction, doors shall be capable of swinging both ways.<br>For manual sliding doors, see Paragraph 3.15.1. | **3.15.1** Doors shall be hung to open in the direction of escape if the door serves a room or area with more than 50 occupants. This includes doors:<br>a) located on an *open path*<br>b) leading into, or within an *exitway*<br>c) at *final exits*.<br>If escape is in either direction, regardless the number of occupants, doors must be capable of swinging both ways.<br>For manual sliding doors, see Paragraph 3.15.4. | **C/AS2 Item 2: Means of escape**<br>It is proposed to amend the wording to clarify that the occupant load is determined based on the room/space rather than assumptions on how many people will use a door. This ensures that a larger number of occupants can open doors in the direction of escape. |
| **3.15.4** In ***risk group* SI** ... | **3.15.2** In ***risk group* SI** ... | **C/AS2 Item 7: Editorial**<br>The paragraph numbers are proposed to be amended to provide a clearer order for the requirements. |
| **3.15.5** Doors on escape routes ... | **3.15.3** Doors on escape routes ... | **C/AS2 Item 7: Editorial**<br>The paragraph numbers are proposed to be amended to |

| Current text | Proposed text | Explanation and justification for change |
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| a) In *open paths*, provide an unobstructed opening width of no less than 760 mm (Table 3.1a) …<br>d) ... ii) is at the same level on both sides of the door for the full width of the *escape route* unless permitted by D1/AS1, and<br>e) When opened, not cause the door swing to obstruct the minimum required width of any *escape route*. For example, doors which open onto a corridor used as an *escape* route shall not obstruct the minimum required width of that *escape route* (see Figure 2.23), and<br>f) ... | a) In *open paths*, provide an unobstructed opening width of no less than 760 mm (Table 3.1b) …<br>d) ... ii) is at the same level on both sides of the door for the full width of the *escape route* unless permitted by NZBC Clause D1, and<br>e) When opened, not cause the door swing to obstruct the minimum required width of any *escape route* (see Figure 2.23), and<br>f) ... | provide a clearer order for the requirements. The reference to Table 3.1a is proposed to be updated to reflect the new proposed Table 3.1b. It is also proposed to update the reference to NZBC Clause D1 to provide more options to demonstrate compliance. |
| **3.15.6** Vision panels shall be provided on doors which<br>a) Are hung to swing both ways, or<br>b) Lead into, or are within *exitways,* except when the door is the egress for a sleeping space (such as a ward bedroom or suite), or<br>c) Subdivide corridors used in *escape routes*. | **3.15.14** Vision panels shall be provided on doors which:<br>a) Are hung to swing both ways, or<br>b) Lead into, or are within *exitways*, except where:<br>i) the door swings inward, or<br>ii) the door is the egress for a sleeping space (such as a ward bedroom or *suite*), or a sanitary facility for use by a single person, or<br>iii) the door serves an unoccupied space, such as a closet, or<br>c) Subdivide corridors used in *escape routes.* | **C/AS2 Item 2: Means of escape**<br>It is proposed to amend this text as there are instances where, due to privacy (single use sanitary facility) or practicality (closet, or the door swings inwards), it is not necessary to have a vision panel on a door. |
| **3.15.7** Revolving doors (see Figure 3.25 (a)), automatic doors (of all types) and access control systems shall: ... | **3.15.12** Revolving doors (see Figure 3.25 (a)), automatic doors (of all types) and access control systems (such as turnstiles or gates) shall: ... | **C/AS2 Item 7: Editorial**<br>It is proposed to renumber this paragraph for clarity of the requirements. Additionally, a text is added to clarify access control systems to state it is |

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| | | about physical impediments such as gates and not electro-magnetic devices. |
| **3.15.8** Paragraph 3.15.7 b) need not apply…<br>**3.15.9** Smoke detector activated hold-open devices…<br>**3.15.10** Detectors for releasing hold-open devices…<br>**3.15.11** Delayed action unlocking devices…<br>*b) Fire* alarm… | **3.15.13** Paragraph 3.15.12 b) need not apply…<br>**3.15.5** Smoke detector activated hold-open devices…<br>**3.15.6** Detectors for releasing hold-open devices…<br>**3.15.9** Delayed action unlocking devices…<br>b) *Fire* alarm… | **C/AS2 Item 7: Editorial**<br>It is proposed to amend the paragraph numbers and references to provide a clearer order of the requirements. b) does not form part of the defined term "Fire" and is proposed to remove the italics from this. |
| **3.15.12** In retail areas serving more than 500 occupants and in crowd activities (as described by ***risk group* CA**) of more than 100 people, panic fastenings shall be fitted on doors on the *escape route* including *exitways* and *final exits*. | **3.15.10** For retail areas, panic fastenings shall be fitted on all doors on the *escape route* (including *exitways* and *final exits*) which serve more than 500 occupants.<br>For all other activities in ***risk group* CA**, panic fastenings shall be fitted on all doors on the *escape route* (including *exitways* and *final exits*) which serve more than 100 occupants. | **C/AS2 Item 2: Means of escape**<br>It is proposed to amend the text to make the requirements more clear. |
| **3.15.13** Panic fastenings are locking devices which shall meet the following requirements:<br>a) The actuating portion shall consist of a horizontal bar or panel which shall extend across no less than half the width of the door leaf and be located between 800 mm and 1200 mm above the floor, and<br>b) When a horizontal force of that able to be applied using one hand to the bar or panel the door lock shall release allowing the door to swing open freely. | **3.15.11** Panic fastenings are latching devices which shall meet the following requirements:<br>a) The actuating portion shall consist of a horizontal bar or panel which shall extend across no less than half the width of the door leaf and be located between 800 mm and 1200 mm above the floor, and<br>b) When a horizontal force not exceeding 67 N is applied to the bar or panel the latch shall release, and<br>c) Panic fastenings shall be openable with only one hand. | **C/AS2 Item 2: Means of escape**<br>This proposal introduces a requirement for the amount of force needed to ensure the door unlatches easily. The force of 67 N is similarly reflected in Appendix C6.1 for the operation of fire doors and smoke control doors. |

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| **3.15.14** Doors on *escape routes*… | **3.15.7** Doors on *escape routes*… | **C/AS2 Item 7:**<br>It is proposed to amend the paragraph numbers to provide a clearer order of the requirements. |
| **Figure 3.25 Revolving and automatic sliding doors**<br>Paragraph 3.15.7 | **Figure 3.25 Revolving and automatic sliding doors**<br>Paragraph 3.15.12 | **C/AS2 Item 7: Editorial**<br>The paragraph reference in the heading of the figure is amended as the paragraph numbers changed. |
| **3.16.1** All building features shall have signs complying with F8/AS1. | **3.16.1** All building features shall have signs complying with NZBC Clause F8. | **C/AS2 Item 7: Editorial**<br>It is proposed to reference NZBC Clause F8 to allow for more options to demonstrate compliance. |
| **C/AS2 Part 4 Control of internal and external fire spread** | | |
| **4.1.2** For *risk group* VP, spaces within the *building* shall be separate *firecells*, with the following requirements:<br>a) *Firecells* shall be *fire separated* from other *firecells* by either:<br>i) the *fire resistance rating* specified in Table 2.4 if the *firecell* is categorised in *risk group* VP, or<br>ii) the higher of the two *fire resistance ratings* specified in Table 2.4 if it is categorised in any other *risk group*,<br>and<br>b) Within the vehicle parking *firecell*, all floors (including *intermediate floors*) and their supporting structures shall achieve a *fire resistance rating* of at least the *life rating*. The *property rating* shall be used where necessary to achieve protection from spread of *fire* | **4.1.2** *Risk group* VP *firecells* shall be separate *firecells* within the *building* with the following requirements:<br>a) *Firecells* shall be *fire separated* from other *firecells* by either:<br>i) the *fire resistance rating* specified in Table 2.4 if the *firecell* is categorised in *risk group* VP, or<br>ii) the higher of the two *fire resistance ratings* specified in Table 2.4 if it is categorised in any other *risk group*, and<br>b) Within the *risk group* VP *firecell*, all floors (including *intermediate* floors) and their supporting structures shall achieve a *fire resistance rating* of at least the *life rating*. The *property rating* shall be used where necessary to achieve protection from spread of *fire* to neighbouring property (see Figure 4.1), and<br>c) Within the *risk group* VP *firecell*, where the parking | **C/AS2 Item 7: Editorial**<br>It is proposed to use the Consistent referencing of risk group VP.<br>More clear wording. |

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| to neighbouring property (see Figure 4.1), and<br>c) Within the vehicle parking *firecell*, where the parking spaces and other areas of that *firecell* are unit titled, it is permitted to have the parking spaces (and an associated storage area limited to plan area of 3.0 $m^2$ and maximum height 3.0 m) unseparated from adjacent titles, and<br>d) Within the vehicle parking *firecell*, other spaces (such as a ticket office, a gate booth or a storeroom not greater than 10 $m^2$ ) are permitted when they are necessary for the operation of the vehicle parking *firecell*, and<br>e) Service vehicle and unloading areas may be part of other support activity *firecells*. | spaces and other areas are unit titled, it is permitted to have the parking spaces (and an associated storage area limited to a plan area of 3.0 $m^2$ and a maximum height of 3.0 m) unseparated from adjacent titles, and<br>d) Within the *risk group* VP *firecell*, other spaces (such as a ticket office, a gate booth or a storeroom not greater than 10 $m^2$) are permitted when they are necessary for the operation of the *risk group* VP *firecell*, and<br>e) Service vehicle and unloading areas may be part of other support activity *firecells*. | |
| **4.1.4** Where natural cross ventilation or sprinklers are provided, the limitations of Paragraph 4.13.4 to 4.13.6 on *intermediate floor* area do not apply. | **4.1.4** Where natural cross ventilation or sprinklers are provided, the limitations of Paragraphs 4.12.4 to 4.12.6 on *intermediate floor* area do not apply. | **C/AS2 Item 7:**<br>It is proposed to amend these references as the paragraphs are proposed to be renumbered. |
| **4.2 Glazing in fire and smoke separations**<br>**4.2.1** Glazing in *fire separations* shall be fixed *fire resisting glazing* having the same *FRR* values for *integrity* and *insulation* as the *fire separation*, except where uninsulated glazing is permitted within vision panels or for sprinklered *buildings* (refer to Paragraph 2.3.13).<br>**4.2.2** Uninsulated *fire resisting glazing* having the same | [Refer to proposed changes for the new Paragraph 4.15] | **C/AS2 Item 7: Editorial**<br>This proposal moves the text from Paragraph 4.2 to be located with other requirements for closures as glazing is a type of closure. The new location in the document is proposed to be Paragraph 4.15 (currently 4.16) and paragraphs in Part 4 are to be renumbered to reflect this change. |

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| *integrity* value as the *fire separation* is permitted in all sprinklered *buildings*.<br>**4.2.3** There is no restriction on the area of glazing in *smoke separations* (including *smoke lobbies*). Non-*fire resisting glazing* may be used if it is toughened or laminated *safety glass*. Glazing shall have at least the same smoke-stopping ability as the *smoke separation.*<br>**Fire doors and smoke control doors**<br>**4.2.4** Glazing in *fire doors* shall be *fire resisting glazing* having the same *integrity* value as the door. If the door requires an *insulation* value, an uninsulated vision panel may be used without downgrading the *insulation* value of the door. Vision panels shall comply with NZS 4520.<br>**4.2.5** Glazing in *smoke control doors* shall meet the requirements for *smoke separations.* | | |
| **4.3 Structural stability during fire**<br>...<br>**4.3.1** ...<br>**4.3.2** ...<br>a) The design and live loads required by NZBC B1, and ...<br>**4.3.3** ...<br>**4.3.4** ...<br>Providing horizontal stability<br>**4.3.5** ... | **4.2 Structural stability during fire**<br>...<br>**4.2.1** ...<br>**4.2.2** ...<br>a) The design and live loads required by NZBC Clause B1, and ...<br>**4.2.3** ...<br>**4.2.4** ...<br>Providing horizontal stability<br>**4.2.5** ... | **C/AS2 Item 7: Editorial**<br>It is proposed to renumber these paragraphs as Paragraph 4.2 is proposed to be moved. |

| Current text | Proposed text | Explanation and justification for change |
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| **4.4 Fire stopping**<br>**Introduction**<br>**4.4.1** ...<br>**4.4.2** ...<br>**4.4.3** ...<br>**4.4.4** ...<br>**4.4.5** ... | **4.3 Fire stopping**<br><br>4.3.1 ...<br>4.3.2 ...<br>4.3.3 ...<br>4.3.4 ...<br>4.3.5 ... | **C/AS2 Item 7: Editorial**<br>It is proposed to renumber these paragraphs as Paragraph 4.2 is proposed to be moved.<br>It is also proposed to remove the header "Introduction" as it is not required to interpret the text and is inconsistent with the writing style of the rest of the document. |
| **Figure 4.2 Permissible positioning of unrated primary elements**<br>Paragraph 4.3.3 | **Figure 4.2 Permissible positioning of unrated primary elements**<br>Paragraph 4.2.3 | **C/AS2 Item 7: Editorial**<br>The paragraph reference in the heading of the figure is proposed to be amended as the paragraph numbering is proposed to be updated. |
| **4.5 Firecell construction**<br>**4.5.1** ...<br>**4.5.2** ...<br>**4.5.3** ...<br>b) Penetrations complying with Paragraph 4.4, and<br>c) For glazing permitted by Paragraph 4.2.<br>**4.5.4** ...<br>**4.5.5** ... (see Figures 4.3, 4.4 and 4.12).<br>**4.5.6** ...<br>**4.5.7** ...<br>**4.5.8** ...<br>**4.5.9** ...<br>**4.5.10** ... Gaps around penetrations shall be fire stopped (see Paragraph 4.4). | **4.4 Firecell construction**<br>**4.4.1** ...<br>**4.4.2** ...<br>**4.4.3** ...<br>b) Penetrations complying with Paragraph 4.3, and<br>c) For glazing permitted by Paragraph 4.15<br>**4.4.4** ...<br>**4.4.5** ...(see Figures 4.3, 4.4 and 4.12).<br>**4.4.6** ...<br>**4.4.7** ...<br>**4.4.8** ...<br>**4.4.9** ...<br>**4.4.10** ... Gaps around penetrations shall be fire stopped (see Paragraph 4.3). | **C/AS2 Item 7: Editorial**<br>It is proposed to renumber these paragraphs and references as Paragraph 4.2 is proposed to be moved. |
| **Figure 4.3 Junction of fire separations – 1**<br>Paragraphs 4.5.5, 4.5.7 and 4.15.3 | **Figure 4.3 Junction of fire separations – 1**<br>Paragraphs 4.4.5, 4.4.7 and 4.14.3 | **C/AS2 Item 7: Editorial**<br>The paragraph reference in the heading of the figure is proposed to be amended as the paragraph numbers are proposed to change. |
| **Figure 4.4 Junction of fire separations – 2** | **Figure 4.4 Junction of fire separations – 2** | **C/AS2 Item 7: Editorial**<br>The paragraph reference in the heading of the figure is |

| Current text | Proposed text | Explanation and justification for change |
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| Paragraphs 4.5.5, 4.5.7 and 4.15.3 | Paragraphs 4.4.5, 4.4.7 and 4.14.3 | proposed to be amended as the paragraph numbers are proposed to change. |
| **4.6 Specific requirements for sleeping areas**<br>**Group sleeping areas**<br>**4.6.1** In *risk group* SM, *group sleeping areas* shall be *fire separated* from each other and from other sleeping and non-sleeping areas with a *FRR* in accordance with Paragraph 2.3. A *group sleeping area firecell* shall contain no more than 40 beds if unsprinklered, or 160 beds if sprinklered.<br>*Group sleeping area firecells* may be subdivided provided that the *firecell* contains no more than 40 beds, whether or not sprinklers are installed.<br>**4.6.2** In ***risk group* SI**, *group sleeping areas* shall be *fire separated* from each other and from other sleeping and non-sleeping areas with a *FRR* in accordance with Paragraph 2.3. Where sleeping accommodation is contained within only a single *group sleeping area firecell*, the number of beds shall not exceed 12.<br>For care facilities (not detention) where the sleeping accommodation is distributed over two or more *group sleeping area firecells*, each *firecell* shall contain no more than 20 beds and shall have sufficient space to accommodate, in an emergency, the beds from an adjacent *firecell* of any occupants unable to walk. | **4.5 Specific requirements for sleeping areas**<br>**Group sleeping areas**<br>**4.5.1** *Group sleeping areas* in *risk groups* SM or SI shall be *fire separated* from each other and from other sleeping and non-sleeping areas with an *FRR* in accordance with Paragraph 2.3.<br>**4.5.2** In *risk group* SM, a *group sleeping area* shall contain no more than:<br>i) 40 beds if unsprinklered, or<br>ii) 160 beds if sprinklered.<br>**4.5.3** In ***risk group* SM**, a *group sleeping area* may contain partitions if:<br>a) the *group sleeping area* contains no more than 40 beds, whether or not sprinklers are installed, and<br>b) the partitions do not fully enclose any occupied space in the *group sleeping area*, and have at least one opening with a minimum height and width as required by Paragraph 3.3 to allow unimpeded travel from any bedspace to the exit of the *group sleeping area firecell, and*<br>c) all occupied spaces within the *group sleeping area* are available to all occupants at any time, and<br>*d)* the openings between the partitions as well as any other part of the *open path* must be | **C/AS2 Item 3: Group sleeping areas**<br>The text is are proposed to be re-ordered to improve the flow of the text and understanding of the requirements. Additionally, requirements from definitions for group sleeping areas, suites and direct support functions are proposed to be included here to ensure they are part of the compliance pathway.<br>The allowance for non-fire rated full height partitions in suites is proposed to be be removed and a suite needs to be either fire rated when fully enclosed or may not be fully enclosed to ensure life safety is not adversely affected. |

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| *Group sleeping area firecells* may be subdivided with full height *smoke separations* including *smoke control doors* which need not be fitted with self-closers.<br>**Direct support functions**<br>**4.6.3** *Direct support functions* to the sleeping area may be included in a *group sleeping area firecell* or *suites* without *fire separations* or *smoke separations*.<br>**Communal service functions for group sleeping areas**<br>**4.6.4** *Communal service functions* shall be separated from *group sleeping areas* with *fire separations* having an *FRR* in accordance with Paragraph 2.3. It is acceptable for these non-sleeping activities to share a common *firecell*.<br>**Service vehicle unloading areas**<br>**4.6.5** Service vehicle and unloading areas within the perimeter walls of a *building* with *risk group* SI or SM shall meet the requirements of *risk group* VP.<br>**Suites**<br>**4.6.6** A *group sleeping area* may be subdivided to form *suites*. Each *suite* shall be a separate *firecell* with *fire separations*<br>having an *FRR* of no less than the *life rating* (refer to Paragraph 2.3).<br>**4.6.7** In *risk group* SM, a sleeping area may be subdivided into separate *suites* (such as a motel unit or hotel room). Each *suite* shall be a | unobstructed. Items such as doors, blinds, hanging fabrics, and curtains are not permitted.<br><br>**4.5.4** For *risk group* SI, if there is only one *group sleeping area*, or the *group sleeping areas* are not adjacent to one another, the *group sleeping area* shall contain no more than 12 beds.<br>Where there are two or more *group sleeping areas* and these are adjacent to one another, each *group sleeping area* shall contain no more than 20 beds and have sufficient space to accommodate, in an emergency, the beds from an adjacent *group sleeping area*.<br>**4.5.5** In ***risk group* SI**, a *group sleeping area* may be subdivided with full height *smoke separations* including *smoke control doors* which need not be fitted with self-closers.<br>There may be no more than 6 beds within each such *smoke separated* area.<br>**Direct support functions**<br>**4.5.6** *Direct support functions* may be included in a *group sleeping area* without *fire* or *smoke separations.*<br>*Direct support functions* may include sanitary facilities and tea making activities for use by the occupants, but may not include cooking facilities.<br><br>**Communal support functions**<br>**4.5.7** *Communal service functions* shall be separated | |

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| separate *firecell* and contain no more than 12 beds.<br>**4.6.8** In *risk group* SI, if sleeping areas are subdivided to create *suites* (see Figure 4.5 b)), each *suite* shall contain no more than 6 beds. *Suites* may be subdivided with non-*fire* rated *construction* to provide separate spaces for sleeping.<br>**4.6.9** Where sanitary facilities are shared between *suites*, those facilities may be contained within one of the *suites*, but<br>entry from other *suites* must be through *fire separations*.<br>**Household units**<br>**4.6.10** In *risk group* SM, every *household unit* shall be a single *firecell* separated from every other *firecell* by *fire separations* having an *FRR* in accordance with Paragraph 2.3.<br>**4.6.11** In *risk group* SM, an individual *household unit* may contain one or more upper floors provided that the *open path* length provisions of Table 3.2 are satisfied.<br>**4.6.12** Where a vehicle parking garage associated with *risk group* SM is provided solely for the use of the occupants of an individual *household unit*, it is acceptable for that garage to be included within the *household unit firecell*. However, where garaging is provided for vehicles of occupants of more than one *household unit*, that space shall be a separate *firecell* complying with the requirements of *risk group* VP. | from *group sleeping areas* or *suites* with *fire separations* having an *FRR* in accordance with Paragraph 2.3.<br>**Suites**<br>**4.5.8** A *suite* shall be a separate *firecell* with *fire separations* with an *FRR* in accordance with Paragraph 2.3.<br>**4.5.9** A *suite* shall contain no more than 12 beds.<br>**4.5.10** A *suite* may be subdivided with non-*fire rated construction* to provide separate spaces for sleeping.<br>**Household units**<br>**4.5.11** A *household unit* shall be a single *firecell* separated from every other *firecell* by *fire separations* having an FRR in accordance with Paragraph 2.3.<br>**4.5.12** A *household unit* may contain one or more floors provided that the *open path* length provisions of Table 3.2 are satisfied.<br>**Vehicles**<br>**4.5.13** Service vehicle and unloading areas within the perimeter walls of a *building* with *risk group* SM or SI shall be a separate *firecell* complying with the requirements of ***risk group* VP**.<br>**4.5.14** Where a vehicle parking garage associated with ***risk group* SM** is provided solely for the use of the occupants of an individual *household unit*, the garage may be included within the *household unit firecell.* | |

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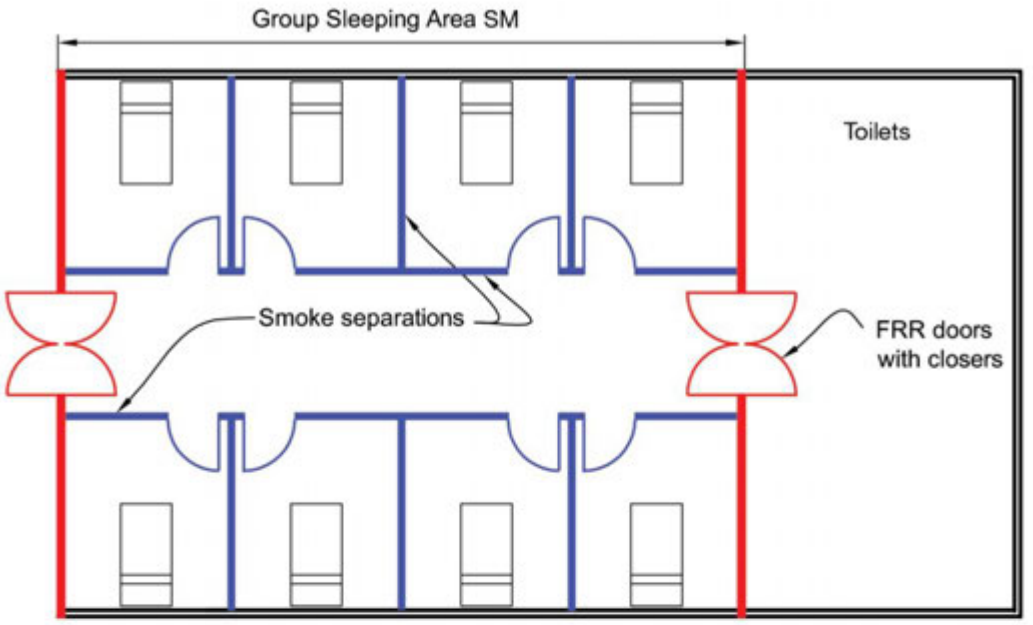
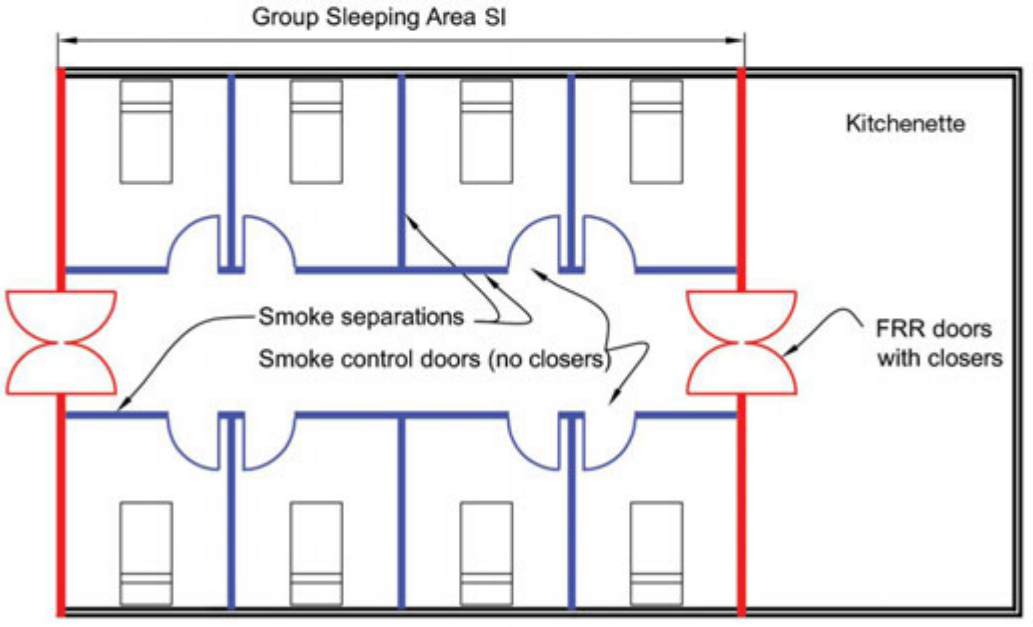
| **Special care facilities**<br>**4.6.13** Spaces where procedures using sedation (including dentistry and dialysis) are carried out require longer evacuation times. Such spaces shall be either:<br>a) Contained in separate *firecells* having *fire separations* with an *FRR* of no less than 60 minutes, or<br>b) Grouped together within a *firecell* which is separated from other activities by *fire separations* with an *FRR* of no less than 60 minutes. Within that *firecell*, each space shall be separated from adjacent spaces by *smoke separations*.<br><br>**Figure 4.5 Group sleeping areas and suites** | Where parking is provided for vehicles of occupants of more than one *household unit*, the parking area shall be a separate *firecell* complying with the requirements of ***risk group*** **VP**.<br>Special care facilities<br>**4.5.15** Spaces where procedures using sedation (including dentistry and dialysis) are carried out require longer evacuation times. Such spaces shall be either:<br>a) Contained in separate *firecells* having *fire separations* with an *FRR* of no less than 60 minutes, or<br>b) Grouped together within a *firecell* which is separated from other activities by *fire separations* with an *FRR* of no less than 60 minutes. Within that *firecell*, each space shall be separated from adjacent spaces by *smoke separations.*<br>**Figure 4.5 Group sleeping areas and suites**<br><br>[Refer to proposed new figure on the next page] | |

## Proposed C/AS2 Figure 4.5 Group sleeping areas

**Figure 4.5** **Group sleeping areas**
Paragraphs 4.5.1 and 4.5.7




(a)




(b) GROUP SLEEPING AREAS

KEY TO WALL FRR
Life rating FRR
Smoke separation walls

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| **4.7 Specific requirements for theatres, exhibition areas and retail spaces in risk group CA**<br>**4.7.1** ...<br>**4.7.2** ...<br>**4.7.3** ...<br>**4.7.4** ...<br>**Exhibition and retail areas**<br>CA **4.7.5** ...<br>**4.8 Tiered seating in risk group CA**<br>**4.8.1** ...<br>**4.8.2** ...<br>**4.8.3** ...<br><br>**Figure 4.6 Theatre proscenium walls**<br>Paragraph 4.7.2 | **4.6 Specific requirements for theatres, exhibition areas and retail spaces**<br>**4.6.1** ...<br>**4.6.2** ...<br>**4.6.3** ...<br>**4.6.4** ...<br>**Exhibition and retail areas**<br>CA WB WS **4.6.5** ...<br>**4.7 Tiered seating in risk group CA**<br>**4.7.1** ...<br>**4.7.2** ...<br>**4.7.3** ...<br><br>**Figure 4.6 Theatre proscenium walls**<br>Paragraphs 4.6.2 | **C/AS2 Item 7: Editorial**<br>The paragraphs are proposed to be renumbered as Paragraph 4.2 is proposed to be moved.<br>It is proposed to add risk group icons WB and WS to the new Paragraph 4.6.5 as retail may occur in these risk groups. |
| **4.10 Intermittent activities**<br>**4.10.1** ... For intermittent activities that provide *direct support functions* within *risk group* SI refer to Paragraph 4.6.3<br>**4.10.2** ... (Refer to Paragraphs 4.11.5 and 4.11.6 for waste chutes)<br>**4.10.3** ...<br>**4.10.4** If plant is contained in a *building* which is solely for the purposes of containing such plant, and that *building* is separated by 3.0 m or more from any adjacent *building*, only Paragraph 4.10.3 c) shall apply.<br><br>**Figure 4.7 Plant, boiler and incinerator rooms**<br>Paragraph 4.10.3 | **4.9 Intermittent activities**<br>**4.9.1** ... For intermittent activities that provide direct support functions within *risk group* SI refer to Paragraph 4.5.3<br>**4.9.2** ... (Refer to Paragraphs 4.10.5 and 4.10.6 for waste chutes)<br>4.9.3 ...<br>**4.9.4** If a plant is contained in a *building* which is solely for the purposes of containing such plant, and that *building* is separated by 3.0 m or more from any adjacent *building*, only Paragraph 4.9.3 c) shall apply.<br><br>**Figure 4.7 Plant, boiler and incinerator rooms**<br>Paragraphs 4.9.3 | **C/AS2 Item 7: Editorial**<br>Paragraphs and references are proposed to be renumbered as Paragraph 4.2 is proposed to be moved.<br>It is also proposed to add "a" before "plant" to correct the grammar. |

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| **4.11 Protected shafts**<br>**4.11.1**…<br>**4.11.2**…<br>**4.11.3**…the relevant requirements of Paragraph 4.4 for *fire stopping* (see Figure 4.8).<br>**4.11.4**…<br>e) Penetrations which satisfy Paragraph 4.4 for *fire stopping*, or…<br>**4.11.5**…<br>**4.11.6**…<br><br>**Figure 4.8 Protected shafts**<br>Paragraph 4.11.2, 4.11.3, 4.13.1 and 4.13.2<br><br>Paragraph 4.11.3 applies<br>Paragraph 4.11.3 applies<br><br>**4.12 Long corridor subdivision**<br>**4.12.1**…<br>**4.14 Subfloor spaces**<br>**4.14.1** …<br><br>**Figure 4.9 Long corridor subdivision**<br>Paragraph 4.12.1 and 4.16.8<br>Distance 'A' shall not exceed: the distance specified in Paragraph 4.12.1<br><br>**Figure 4.10 Subfloor spaces**<br>Paragraph 4.14.1<br><br>**4.15 Concealed spaces**<br>**4.15.1** … see Paragraph 4.4)<br>Concealed spaces within firecells<br>4.15.2 …<br>f) … as required by Paragraph 4.18.1. | **4.10 Protected shafts**<br>**4.10.1** …<br>**4.10.2** …<br>**4.10.3** … the relevant requirements of Paragraph 4.3 for *fire stopping* (see Figure 4.8).<br>**4.10.4** …<br>e) Penetrations which satisfy Paragraph 4.3 for *fire stopping*, or<br>**4.10.5** …<br>**4.10.6** …<br><br>**Figure 4.8 Protected shafts**<br>Paragraphs 4.10.2, 4.10.3, 4.12.1 and 4.12.2<br><br>Paragraph 4.10.3 applies<br>Paragraph 4.10.3 applies<br><br>**4.11 Long corridor subdivision**<br>**4.11.1** …<br>**4.13 Subfloor spaces**<br>**4.13.1** …<br><br>**Figure 4.9 Long corridor subdivision**<br>Paragraphs 4.11.1 and 4.15.8<br>Distance 'A' shall not exceed: the distance specified in Table 4.1<br><br>**Figure 4.10 Subfloor spaces**<br>Paragraph 4.13.1<br><br>**4.14 Concealed spaces**<br>**4.14.1** … see Paragraph 4.3)<br>Concealed spaces within firecells<br>4.14.2 …<br>f) … as required by Paragraph 4.17.1. | **C/AS2 Item 7: Editorial**<br>These paragraphs and paragraph references are proposed to be amended because Paragraph 4.2 is proposed to be moved. |

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| **Cavity barriers in walls and floors**<br>**4.15.3** ... or be *fire stopped* (see Paragraph 4.4) ...<br>(4.15.4: see C/AS2 Item 4)<br>Cavity barrier construction<br>**4.15.5** ...<br>Restriction of roof and ceiling space areas in unsprinklered firecells<br>**4.15.6** ...<br>**4.15.7**...<br>**4.15.8** ... | **Cavity barriers in walls and floors**<br>**4.14.3** ... or be *fire stopped* (see Paragraph 4.3) ...<br>(4.14.4: see C/AS2 Item 4)<br>Cavity barrier construction<br>**4.14.5** ...<br>Restriction of roof and ceiling space areas in unsprinklered firecells<br>**4.14.6** ...<br>**4.14.7**...<br>**4.14.8** ... | |
| **Exceptions to cavity barrier requirements**<br>**4.15.4** *Cavity barriers* are not required in the following circumstances:<br>a) Below a floor next to the ground if the *concealed space* is:<br>i) less than 1.0 m in height, or<br>ii) not normally accessed and has no openings through which litter can accumulate, or<br>b) If the *concealed space* results from the over cladding of an *existing external* wall or roof, provided that the existing cladding is *non-combustible*, or<br>c) In a wall or roof panel system encapsulated with a material having a *Group Number* of no greater than 2. | **Exceptions to cavity barrier requirements**<br>**4.14.4** *Cavity barriers* are not required below a floor next to the ground if the *concealed space* is:<br>a) less than 1.0 m in height, or<br>b) not normally accessed and has no openings through which litter can accumulate. | **C/AS2 Item 4: Cladding**<br>In order to align with the proposed changes to external cladding systems, the exemptions for concealed spaces in items b) and c) are proposed to be removed.<br><br>Continuous vertical channels and cavities within external wall cladding systems are known to promote upward vertical fire spread. Fire researchers have noted that when flames are confined within a vertical cavity or channel they elongate, leading to flame extension of up to five to ten times the expected unconfined flame lengths. This is true even in cavities without additional combustible materials present, but is made worse by the presence of combustible materials. This flame extension effect can support rapid, potentially unseen, fire spread within an external wall cladding system and must be limited. |

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| **Figure 4.11 Concealed spaces within firecells**<br>Paragraph 4.15.2<br>Notes 2. ... see Paragraphs 4.15.2 (e) and (f) ...<br><br>**Figure 4.12 Curtain wall**<br>Paragraph 4.15.3 and 4.5.5<br><br>**Table 4.2 Insulation and smoke stop capability of closures in fire and smoke separations**<br>Paragraph 4.16 | **Figure 4.11 Concealed spaces within firecells**<br>Paragraph 4.14.2<br>Notes 2. ... see Paragraphs 4.14.2 (e) and (f) ...<br><br>**Figure 4.12 Curtain wall**<br>Paragraphs 4.4.5 and 4.14.3<br><br>**Table 4.2 Insulation and smoke stop capability of closures in fire and smoke separations**<br>Paragraph 4.15 | **C/AS2 Item 7: Editorial**<br>The paragraph references in the figure are proposed to be amended as the paragraph numbers are proposed to change. |
| **4.16 Closures in fire and smoke separations**<br>**Introduction**<br>**4.16.1** ...<br>**4.16.2** ...<br>b) Smoke control doors shall, excepts as allowed by Paragraph 4.16.3, comply with Appendix C C6.1.2, and ...<br>**4.16.3** ...<br>Fire doors and smoke control door installation<br>**4.16.4** ...<br>**Doorset markings**<br>**4.16.5** ...<br>**4.16.6** ...<br>**Glazing in doors**<br>**4.16.7** Glazing in fire doors and smoke control doors shall comply with Paragraph 4.2<br>**Smoke control doors**<br>**4.16.8** *Smoke control* doors complying with Paragraphs 4.16.2 to 4.16.7 shall be provided:<br>a) ...<br>b) Where a corridor or an *escape route* passes through a *smoke separation* (see Figure | **4.15 Closures in fire and smoke separations**<br><br>**4.15.1** ...<br>**4.15.2** ...<br>b) Smoke control doors shall, excepts as allowed by Paragraph 4.15.3, comply with Appendix C C6.1.2, and ...<br>**4.15.3** ...<br>Fire doors and smoke control door installation<br>**4.15.4** ...<br>**Doorset markings**<br>**4.15.5** ...<br>**4.15.6** ...<br><br>**Smoke control doors**<br>**4.15.7** *Smoke control* doors complying with Paragraphs 4.15.2 to 4.15.6 and 4.15.13 shall be provided:<br>a) ...<br>b) Where a corridor or an *escape route* passes through a | **C/AS2 Item 7: Editorial**<br>It is proposed to move Paragraph 4.2 to within the new Paragraph 4.15 as fire resisting glazing forms a type of closure. As part of this, it is proposed to amend the paragraph numbers and references as paragraphs are proposed to be renumbered.<br>It is proposed to remove the header 'introduction' as it is not consistent with the writing style in the rest of the document. References to Figures 4.13 and 4.14 are proposed to be removed as these figures are proposed to be removed from the document.<br><br>It is also proposed amend the text for fire shutters as installing a fire shutter alone may not be sufficient to ensure a floor is a fire separation. |

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| 4.13 and for long corridors Figure 4.9), and<br>c) Between an *open path* and a *smoke lobby* (see Figures 4.14 and 4.15)<br>**Fire doors**<br>**4.16.9** *Fire doors* shall be provided:<br>a) Between an *open path* and a *safe path* (see Figures 4.15 and 4.16), and<br>b) Between a *smoke lobby* and a *safe path* (see Figure 4.15), and<br>c) Where the *escape route* passes through a *fire separation* (see Figure 4.16) or into an adjoining *building* (see Figure 3.10), and<br>d) Where the *escape route* passes through a *fire separation* which isolates the *safe path* from levels below the *final exit* (see<br>Figure 4.17), and<br>e) In *fire separations* between vertical and horizontal portions of internal *safe paths*. | *smoke separation* (see Figure 4.9), and<br>c) Between an *open path* and a *smoke lobby* (see Figure 4.13)<br>**Fire doors**<br>**4.15.8** *Fire doors* shall be provided:<br>a) Between an *open path* and a *safe path* (see Figures 4.13 and 4.14), and<br>b) Between a *smoke lobby* and a *safe path* (see Figure 4.13), and<br>c) Where the *escape route* passes through a *fire separation* (see Figure 4.14) or into an adjoining building (see Figure 3.10), and<br>d) Where the *escape route* passes through a *fire separation* which isolates the *safe path* from levels below the *final exit* (see<br>Figure 4.15), and<br>e) In *fire separations* between vertical and horizontal portions of internal *safe paths.*<br>**Glazing in fire and smoke separations**<br>**4.15.9** Fire resisting glazing in *fire separations* shall be fixed, and have a) an integrity rating the same as required for the *FRR* of the fire separation, and<br>b) an *insulation* performance as required by Table 4.2<br>**4.15.10** Uninsulated *fire resisting glazing* having the same *integrity* value as the *fire separation* is permitted in all sprinklered<br>*buildings*.<br>**4.15.11** There is no restriction on the area of glazing in *smoke* | |

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| | *separations* (including *smoke lobbies*). Non-*fire resisting glazing* may be used if it is toughened or laminated *safety glass*. Glazing shall have at least the same smoke-stopping ability as the *smoke separation.*<br>**4.15.12** Glazing in *fire doors* shall be *fire resisting glazing* having the same *integrity* value as the door. If the door requires an *insulation* value, an uninsulated vision panel may be used without downgrading the *insulation* value of the door. Vision panels shall comply with NZS 4520.<br>**4.15.13** Glazing in *smoke control doors* shall meet the requirements for *smoke separations.* | |
| **Protected shaft access panels**<br>**4.16.10** Access panels to… | **Protected shaft access panels**<br>**4.15.14**… | |
| Lift landing doors<br>**4.16.11** Other than where Paragraph 3.10.3 or a passenger lift within a vertical *safe path* applies, doorsets for lift landing doors opening into lift shafts which are *protected shafts* shall be *fire doors* complying with Paragraphs 4.16.1 to 4.16.3 except that an *insulation* rating is not required. Lift landing doors need not be *fire* rated from the shaft side. | **Lift landing doors**<br>**4.15.15** Other than where Paragraph 3.10.4 or a passenger lift within a vertical *safe path* applies, doorsets for lift landing doors opening into lift shafts which are *protected shafts* shall be *fire doors* complying with Paragraphs 4.15.1 to 4.15.3 except that an *insulation* rating is not required. Lift landing doors need not be *fire* rated from the shaft side. | |
| **Fire and smoke dampers**<br>**4.16.12** Any duct…<br>**4.16.13** Where evacuation is delayed…<br>**4.16.14** Where a *smoke damper* is used… | **Fire and smoke dampers**<br>**4.15.16** Any duct…<br>**4.15.17** Where evacuation is delayed…<br>**4.15.18** Where a *smoke damper* is used… | |

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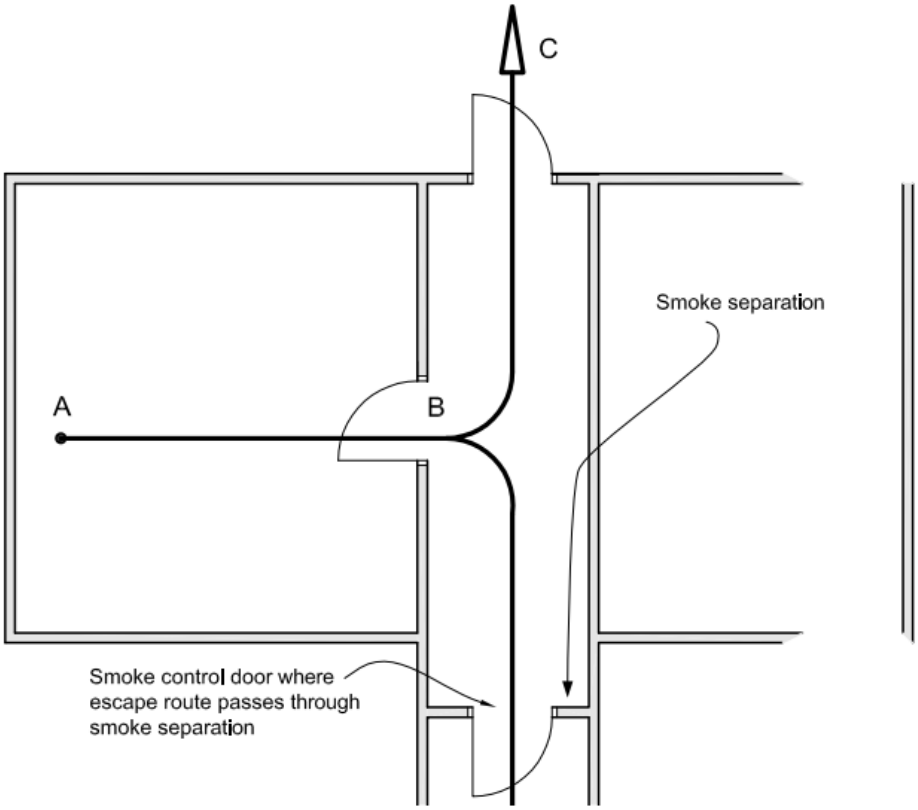
| **Fire shutters**<br>**4.16.15** If a floor has a service opening (for stairs, conveyor, forklift access or similar installation) which is not used as part of an *escape route* and which is fitted with a *fire shutter*, the floor may be treated as a *fire separation.*<br>**4.16.16** The *fire shutter* shall…<br>**4.16.17** A *fire shutter* shall… | **Fire shutters**<br>**4.15.19** A service opening in a *fire separation* (for stairs, conveyor, forklift access or similar installation) which is not used as part of an *escape route* may be fitted with a *fire shutter.*<br>**4.15.20** The *fire shutter* shall…<br>**4.15.21** A *fire shutter* shall… | |
| **Figure 4.13 Smoke control doors**<br>[Refer to the current figure on the following page]<br>Figure 4.14 Smoke control doors to smoke lobbies<br>[Refer to the current figure on the following pages] | Delete<br>Delete | **C/AS2 Item 7: Editorial**<br>This proposal removes two figures as they do not provide added value in the interpretation of the requirements. Current Figures 4.15 and 4.16 provide adequate illustration. |
| **Figure 4.15 Fire doors and smoke control doors**<br>Paragraphs 4.16.8 and 4.16.9<br>**Figure 4.16 Fire doors**<br>Paragraph 4.16.9<br>**Figure 4.17 Fire doors to separate floors above and below final exit level**<br>Paragraphs 4.16.9 d) | **Figure 4.13 Fire doors and smoke control doors**<br>Paragraphs 4.15.7 and 4.15.8<br>**Figure 4.13 Fire doors**<br>Paragraph 4.15.8<br>**Figure 4.14 Fire doors to separate floors above and below final exit level**<br>Paragraphs 4.15.8 d) | C/AS2 Item 7:<br>These figures are proposed to be renumber because Figures 4.13 and 4.14 are proposed to be removed.<br>Paragraph referencing is also proposed to be updated as paragraphs are proposed to be renumbered. |

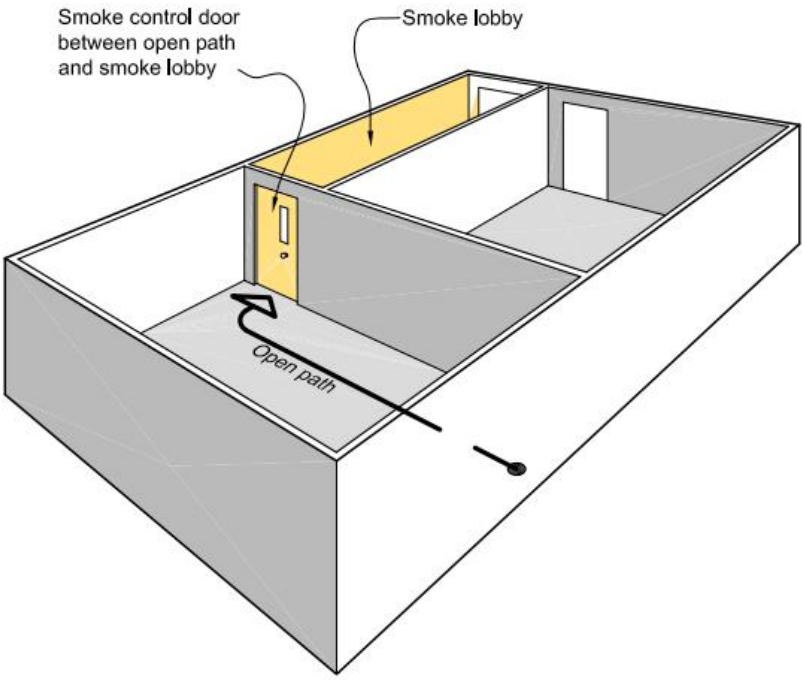
## Current C/AS2 Figure 4.13 Smoke control doors [To be removed]

**Figure 4.13** **Smoke control doors**
Paragraph 4.16.8



## Current C/AS2 Figure 4.14 Smoke control doors to smoke lobbies [To be removed]

**Figure 4.14** **Smoke control doors to smoke lobbies**
Paragraph 4.16.8



| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **4.17 Interior surface finishes, floor coverings and suspended flexible fabrics**<br>**Surface finish requirements for walls and ceilings**<br>**4.17.1** Surface finish requirements…<br>**4.17.2** If foamed plastic ... This requirement does not apply to building elements listed in Paragraph 4.17.6.<br>**Flooring**<br>**4.17.3** Flooring ...<br>**4.17.4** Paragraph 4.17.3 shall apply ...<br>**Wood and wood products in floors**<br>**4.17.5** In addition ...<br>**Exceptions to surface finish requirements**<br>**4.17.6** Surface finish requirements ...<br>**Educational buildings**<br>**4.17.7** Unsprinklered firecells ...<br>**Suspended flexible fabrics**<br>**4.17.8** When tested to AS 1530.2, suspended flexible fabrics shall, within all occupied spaces including exitways:<br>a) Have a flammability index of no greater than 12, and<br>b) When used as underlay to roofing or exterior cladding that is exposed to view, have a flammability index of no greater than 5. | **4.16 Interior surface finishes, floor coverings and suspended flexible fabrics**<br>**Surface finish requirements for walls and ceilings**<br>**4.16.1** *Surface finish* requirements ...<br>**4.16.2** If *foamed plastic* ... This requirement does not apply to *building* elements listed in Paragraph 4.16.6.<br>**Flooring**<br>**4.16.3** Flooring ...<br>**4.16.4** Paragraph 4.16.3 shall apply ...<br>**Wood and wood products in floors**<br>**4.16.5** In addition ...<br>**Exceptions to surface finish requirements**<br>**4.16.6** *Surface finish* requirements ...<br>Educational buildings<br>**4.16.7** Unsprinklered *firecells* ...<br>**Suspended flexible fabrics**<br>**4.16.8** When tested to AS 1530.2, suspended flexible fabrics (such as curtains, drapes, other vertically hung ornamental fabrics, flexible canopies and exposed building overlay which may lie at or near the horizontal) shall, within all occupied spaces including *exitways*:<br>a) Have a *flammability index* of no greater than 12, and<br>b) When used as underlay to roofing or exterior cladding that is exposed to view, have a *flammability index* of no greater than 5. | C/AS2 Item 7:<br>It is proposed to renumber these paragraphs and paragraph references because Paragraph 4.2 has moved.<br><br>It is also proposed to include examples of fabrics in Paragraph 4.16.8 to assist with clarification of the requirements. These examples were previously found in Paragraph 6.20.17 of C/AS1 Amendment 9 2011. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Membrane structures**<br>**4.17.9** The fabric of…<br>**4.17.10** The requirements for…<br>**Building services**<br>**4.17.11** Where air ducts ...<br>**4.17.12** The surfaces of…<br>**Trampers' huts**<br>**4.17.13** In trampers' huts…<br>**4.18 Building services plant**<br>**4.18.1**… | **Membrane structures**<br>**4.16.9** The fabric of…<br>**4.16.10** The requirements for…<br>**Building services**<br>**4.16.11** Where air ducts…<br>**4.16.12** The surfaces of…<br>**Trampers' huts**<br>**4.16.13** In trampers' huts…<br>**4.17 Building services plant**<br>**4.17.1**… | |
| **Table 4.3 Internal surface finishes**<br><br>**Table 4.4 Surfaces of building services**<br><br>**Table 4.5 Critical radiant flux requirements for flooring (kW/m²)**<br>Paragraph 4.17.3 | **Table 4.3 Internal surface finishes**<br>Paragraph 4.16<br><br>**Table 4.4 Surfaces of building services**<br>Paragraphs 4.16.12 and 4.16.13<br><br>**Table 4.5 Critical radiant flux requirements for flooring (kW/m²)**<br>Paragraph 4.16.3 | **C/AS2 Item 7: Editorial**<br>This proposal is an amendment to include paragraph references for these tables to provide clarity of where the requirements can be found in the text. |
| **C/AS2 Part 5 Control of external fire spread** | | |
| **5.4 Small openings and fire resisting glazing**<br>**5.4.1** *External wall construction* shall meet the following requirements:<br>a) *Unprotected areas* (referred to as Type A areas) and areas of *fire resisting glazing* (referred to as Type B areas) shall be located to comply with Figure 5.1, and<br>b) The remainder of the wall shall be *fire* rated in accordance with Paragraph 5.5.<br>**Size and spacing of Type A and Type B areas**<br>**5.4.2** Type A areas shall be no greater than 0.1 m². Type B | **5.4 Small openings and fire resisting glazing**<br>**5.4.1** *External wall construction* shall meet the following requirements:<br>a) Small *unprotected areas* no greater than 0.1 m² (referred to as Type A areas) and areas of *fire resisting glazing* (referred to as Type B areas) shall be located to comply with Figure 5.1, and<br>b) The remainder of the wall shall be *fire* rated in accordance with Paragraph 5.5.<br>**5.4.2** The *fire resisting glazing* shall be rated for *integrity*, and the *FRR* of both the glazing and | **C/AS2 Item 5: Control of external fire spread**<br>The text is proposed to be amended to provide clarity on the unprotected openings this section applies to (small areas). Paragraph 5.4.2 and 5.4.3 are proposed to be switched as the heading "Size and spacing of Type A and Type B areas" does not apply to a description of fire ratings for fire resisting glazing. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| areas shall be no greater than permitted by Table 5.1 according to the distance from the *relevant boundary*.<br>**5.4.3** The *fire resisting glazing* shall be rated for *integrity*, and the *FRR* of both the glazing and the *external wall* shall be in accordance with Paragraph 2.3. | the *external wall* shall be in accordance with Paragraph 2.3.<br>**Size and spacing of Type A and Type B areas**<br>**5.4.3** Type A areas shall be no greater than 0.1 $m^2$. Type B areas shall be no greater than permitted by Table 5.1 according to the distance from the *relevant boundary*. | |
| **5.5 Table method for external walls**<br>5.5.1 The table method for external walls is a means of satisfying the requirements of this Acceptable Solution for the control of external fire spread and shall be applied to external walls of buildings which are parallel to or angled at less than 90° to the relevant boundary. Table 5.2 (for the applicable risk group) is split into three parts according to the angle incident between the subject wall and the relevant boundary. If the wall is parallel to the boundary or the angle is less than 45°, then columns 2 and 3 shall be used (see Figure 5.2 and Figure 5.3). | **5.5 Table method for external walls**<br>**5.5.1** The table method for *external walls* is a means of satisfying the requirements of this Acceptable Solution for the control of external *fire* spread and shall be applied to *external walls* of *buildings* which are parallel to or angled at less than 90° to the *relevant boundary*.<br>The maximum *unprotected area* for *external walls* shall be specified in:<br>a) Table 5.2a for *risk groups* SM and SI, and<br>b) Table 5.2b for *risk group* CA, and<br>c) Table 5.2c for *risk group* WB professional activities, industrial activities, and intermittently occupied buildings and *risk group* VP, and<br>d) Table 5.2d for *risk group* WB storage activities, and<br>e) Table 5.2e for *risk group* WS.<br>Tables 5.2a, 5.2b, 5.2c, 5.2d and 5.2e are split into three parts according to the angle incident between the subject | **C/AS2 Item 5: Control of external fire spread**<br>The text is proposed to be amended to provide clarity of the requirements for each risk group and reference updated numbering for the applicable tables. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | wall and the *relevant boundary* (see Figure 5.2 and Figure 5.3). | |
| **5.5.3** Table 5.2 can also be used to determine the required distance from the relevant boundary to the closest unprotected area where the percentage of unprotected area has previously been determined. Select the appropriate percentage (under the rectangle width column) and read the permitted distance to the relevant boundary from the left hand column of Table 5.2.<br><br>**5.5.4** If Table 5.2 does not contain the exact measurements for the firecell being considered, use the next highest value for percentage area or next lowest value for boundary distance. | **5.5.3** Tables 5.2a, 5.2b, 5.2c, 5.2d and 5.2e can also be used to determine the required distance from the *relevant boundary* to the closest *unprotected area* where the percentage of *unprotected area* has previously been determined. Select the appropriate percentage based on the angle and *firecell* width and read the permitted distance to the *relevant boundary* from the minimum distance column.<br><br>**5.5.4** If Tables 5.2a, 5.2b, 5.2c, 5.2d and 5.2e do not contain the exact measurements for the *firecell* being considered, use the next highest value for percentage area or next lowest value for *boundary* distance. | **C/AS2 Item 5: Control of external fire spread**<br>The text is proposed to be amended to reference the proposed amended tables and relevant column headings within the tables. |
| **5.5.7** As an alternative to the table method, the "Commentary for Building Code Clauses C1–C6 and Verification Method C/VM2 – Appendix A: Methodology for Horizontal Fire Spread (Tabular Data)" can be used. For the Commentary method, the unprotected area tables and the wing/return wall tables in the Commentary must be used together. | **5.5.7** As an alternative to the table method, C/VM2 Appendix C: Methodology for design scenario HS: Horizontal fire spread (Tabular Data) can be used. For the C/VM2 Appendix C method, the *unprotected area* tables and the wing/return wall tables must be used together. | **C/AS2 Item 5: Control of external fire spread**<br>The text is proposed to be amended to reference the proposed C/VM2 Appendix C.<br>The tabular data method was previously found in Appendix A of the document "Commentary for Building Code Clauses C1-C6 and Verification Method C/VM2". |
| **Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$)**<br>Paragraph 5.4.2<br><br>Buildings other than warehouses with storage | **Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$)**<br>Paragraph 5.4.3<br><br>Professional activities, industrial activities, and | **C/AS2 Item 5: Control of external fire spread**<br>The text descriptions in the column headers for this table are proposed to be amended to reflect the appropriate text |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| height greater than 3.0 m but less than 5.0 m<br><br>Warehouses with storage height greater than 3.0 m but less than 5.0 m<br><br>Unsprinklered WB<br><br>[Refer to the current table on the following pages] | intermittently occupied buildings & risk group VP<br><br>Storage activities<br><br>Unsprinklered WB – refer to proposed table of amended values<br><br>[Refer to the proposed table on the following pages] | from the description of risk groups within Table 1.1.<br><br>Additionally, the values for unsprinklered WB Storage activities have been amended. In creation of C/AS2 First Edition 2019, these values were inaccurately copied from the previous Acceptable Solution C/AS5 Amendment 4 2017 document. |
| **Table 5.2/1 for risk group SM only**<br>**Table 5.2/2 for risk group SI only**<br><br>**Table 5.2/3 for risk group CA only**<br><br>**Table 5.2/4a for risk groups WB and VP only**<br><br>**Table 5.2/4b for risk group WB only** | **Table 5.2a Maximum percentage of unprotected area for external walls for risk groups SM and SI**<br>Paragraphs 5.2.8, 5.5.1 a), 5.5.3, 5.5.4 and 5.5.3<br><br>**Table 5.2b Maximum percentage of unprotected area for external walls for risk group CA**<br>Paragraphs 5.2.8, 5.5.1 b), 5.5.3, 5.5.4 and 5.5.3<br><br>**Table 5.2c Maximum percentage of unprotected area for external walls for risk group WB professional activities, industrial activities , and intermittently occupied buildings and risk group VP**<br>Paragraphs 5.2.8, 5.5.1 c), 5.5.3, 5.5.4 and 5.5.3<br><br>**Table 5.2d Maximum percentage of unprotected area for external walls for risk group WB storage activities**<br>Paragraphs 5.2.8, 5.5.1 d), 5.5.3, 5.5.4 and 5.5.3 | **C/AS2 Item 5: Control of external fire spread**<br>The table numbers and formatting are proposed to be amended to provide consistent formatting and terminology in the rest of the document including the use of “less than” and “more than” signs instead of text. Table 5.2/1 and Table 5.2/2 are proposed to be combined into Table 5.2a as they are both similar outcomes for the given input data. A single value for risk group SI has been amended from 80% to 70% to maintain consistency of the requirements between the risk groups. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **Table 5.2/5 for risk group WS only**<br><br>Up to<br><br>Greater than | **Table 5.2e Maximum percentage of unprotected area for external walls for risk group WS**<br>Paragraphs 5.2.8, 5.5.1 e), 5.5.3, 5.5.4 and 5.5.3<br><br>≤<br><br>><br><br>[Refer to proposed tables on the following pages] | |
| **Table 5.3/1, Table 5.3/2, Table 5.3/3, Table 5.3/4, Table 5.3/5** | **Table 5.3 Maximum size of largest permitted single unprotected area in external walls**<br>Paragraphs 5.2.8, 5.5.5 and 5.5.6<br>[Refer to proposed table on the following pages] | **C/AS2 Item 5: Control of external fire spread**<br>The various tables for 5.3 are proposed to be combined into one table to fit on one page. |

## Current C/AS2 Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$)

| Table 5.1 | Maximum permitted areas of fire resisting glazing ($m^2$) Paragraph 5.4.2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum distance to relevant boundary (m) | Risk groups | | | | | | | |
| | SM [1] | CA | | WB & VP Buildings other than warehouses with storage height greater than 3.0 m but less than 5.0 m | | WB Warehouses with storage height greater than 3.0 m but less than 5.0 m | | WS |
| | Un-sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Sprinklered |
| 0.0 | 1.0 | 1.0 | 5.0 | 1.0 | 5.0 | 1.0 | 1.0 | 1.0 |
| 0.1 | 1.0 | 1.0 | 6.5 | 1.0 | 6.0 | 1.0 | 1.0 | 10.0 |
| 0.2 | 1.0 | 1.0 | 7.5 | 1.0 | 7.5 | 1.0 | 1.0 | 1.0 |
| 0.3 | 1.0 | 1.0 | 9.0 | 1.0 | 9.0 | 1.0 | 1.0 | 10 |
| 0.4 | 1.0 | 1.0 | 10.0 | 1.0 | 10.0 | 1.0 | 1.5 | 1.5 |
| 0.5 | 1.5 | 1.0 | 11.0 | 1.0 | 11.0 | 1.0 | 2.5 | 2.5 |
| 0.6 | 2.0 | 1.0 | 13.0 | 1.0 | 13.0 | 1.0 | 3.5 | 3.5 |
| 0.7 | 3.0 | 1.5 | 14.0 | 1.5 | 14.0 | 1.0 | 5.0 | 5.0 |
| 0.8 | 3.5 | 2.0 | 15.0[3] | 2.0 | 15.0[3] | 1.0 | 6.5 | 6.5 |
| 0.9 | 5.0 | 3.0 | | 2.5 | | 1.5 | 7.5 | 7.5 |
| 1.0 | 6.0 | 3.5 | | 3.5 | | 1.5 | 8.5 | 8.5 |
| 1.1 | 7.5 | 4.5 | | 4.0 | | 1.5 | 9.5 | 9.5 |
| 1.2 | 8.5 | 5.5 | | 5.5 | | 2.5 | 10.0 | 10.0 |
| 1.3 | 10.0 | 7.0 | | 7.0 | | 2.5 | 11.0 | 11.0 |
| 1.4 | 12.0 | 8.0 | | 8.0 | | 3.5 | 12.0 | 12.0 |
| 1.5 | 13.0 | 8.5 | | 8.5 | | 4.0 | 13.0 | 13.0 |
| 1.6 | 14.0 | 9.5 | | 9.5 | | 5.0 | 14.0 | 14.0 |
| 1.7 | 15.0[2] | 10.0 | | 10.0 | | 5.5 | 15.0[3] | 15.0[3] |
| 1.8 | | 10.0 | | 10.0 | | 5.5 | | |
| 1.9 | | 11.0 | | 11.0 | | 6.0 | | |
| 2.0 | | 12.0 | | 12.0 | | 6.0 | | |
| 2.1 | | 13.0 | | 13.0 | | 7.0 | | |
| 2.2 | | 14.0 | | 14.0 | | 7.5 | | |
| 2.3 | | 15.0[3] | | 15.0[3] | | 8.0 | | |
| 2.4 | | | | | | 8.5 | | |
| 2.5 | | | | | | 9.0 | | |
| 2.6 | | | | | | 9.5 | | |
| 2.7 | | | | | | 10.0 | | |
| 2.8 | | | | | | 11.0 | | |
| 2.9 | | | | | | 11.0 | | |

## Current C/AS2 Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$) /continued

| Table 5.1 | Maximum permitted areas of fire resisting glazing ($m^2$) /continued<br>Paragraph 5.4.2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum distance to relevant boundary (m) | Risk groups | | | | | | | |
| | SM [1] | CA | | WB & VP<br>Buildings other than warehouses with storage height greater than 3.0 m but less than 5.0 m | | WB<br>Warehouses with storage height greater than 3.0 m but less than 5.0 m | | WS |
| | Un-sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Sprinklered |
| 3.1 | | | | | | 12.0 | | |
| 3.2 | | | | | | 13.0 | | |
| 3.4 | | | | | | 14.0 | | |
| 3.5 | | | | | | 15.0[3] | | |

Notes:

1. For sprinklered *firecells* in ***risk groups*** **SM** and **SI** there is no limit on the permitted area of *fire resisting glazing.*

2. For unsprinklered *firecells* in ***risk group*** **SM** there is no limit on the permitted area of *fire resisting glazing* at distances greater than 1.7 m from the *relevant boundary*.

3. For all ***risk groups*** **other than SM** and **SI** the maximum permitted area of *fire resisting glazing* is 15 $m^2$.

## Proposed C/AS2 Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$)

| Table 5.1 | Maximum permitted areas of fire resisting glazing ($m^2$)<br>Paragraphs 5.2.8 and 5.4.3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum distance to relevant boundary (m) | Risk groups | | | | | | | |
| | SM [1] | CA | | WB & VP<br>Professional activities, industrial activities, and intermittently occupied buildings & risk group VP | | WB<br>Storage activities | | WS |
| | Un-sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Sprinklered |
| 0.0 | 1.0 | 1.0 | 5.0 | 1.0 | 5.0 | 1.0 | 1.0 | 1.0 |
| 0.1 | 1.0 | 1.0 | 6.5 | 1.0 | 6.0 | 1.0 | 1.0 | 10.0 |
| 0.2 | 1.0 | 1.0 | 7.5 | 1.0 | 7.5 | 1.0 | 1.0 | 1.0 |
| 0.3 | 1.0 | 1.0 | 9.0 | 1.0 | 9.0 | 1.0 | 1.0 | 10 |
| 0.4 | 1.0 | 1.0 | 10.0 | 1.0 | 10.0 | 1.0 | 1.5 | 1.5 |
| 0.5 | 1.5 | 1.0 | 11.0 | 1.0 | 11.0 | 1.0 | 2.5 | 2.5 |
| 0.6 | 2.0 | 1.0 | 13.0 | 1.0 | 13.0 | 1.0 | 3.5 | 3.5 |
| 0.7 | 3.0 | 1.5 | 14.0 | 1.5 | 14.0 | 1.0 | 5.0 | 5.0 |
| 0.8 | 3.5 | 2.0 | 15.0[3] | 2.0 | 15.0[3] | 1.0 | 6.5 | 6.5 |
| 0.9 | 5.0 | 3.0 | | 2.5 | | 1.5 | 7.5 | 7.5 |
| 1.0 | 6.0 | 3.5 | | 3.5 | | 1.5 | 8.5 | 8.5 |
| 1.1 | 7.5 | 4.5 | | 4.0 | | 2.0 | 9.5 | 9.5 |
| 1.2 | 8.5 | 5.5 | | 5.5 | | 2.5 | 10.0 | 10.0 |
| 1.3 | 10.0 | 7.0 | | 7.0 | | 3.0 | 11.0 | 11.0 |
| 1.4 | 12.0 | 8.0 | | 8.0 | | 3.5 | 12.0 | 12.0 |
| 1.5 | 13.0 | 8.5 | | 8.5 | | 4.0 | 13.0 | 13.0 |
| 1.6 | 14.0 | 9.5 | | 9.5 | | 5.0 | 14.0 | 14.0 |
| 1.7 | 15.0[2] | 10.0 | | 10.0 | | 5.5 | 15.0[3] | 15.0[3] |
| 1.8 | | 10.0 | | 10.0 | | 6.0 | | |
| 1.9 | | 11.0 | | 11.0 | | 6.5 | | |
| 2.0 | | 12.0 | | 12.0 | | 7.0 | | |
| 2.1 | | 13.0 | | 13.0 | | 7.5 | | |
| 2.2 | | 14.0 | | 14.0 | | 8.0 | | |
| 2.3 | | 15.0[3] | | 15.0[3] | | 8.5 | | |
| 2.4 | | | | | | 9.0 | | |
| 2.5 | | | | | | 9.5 | | |
| 2.6 | | | | | | 10.0 | | |
| 2.7 | | | | | | 11.0 | | |
| 2.8 | | | | | | 11.0 | | |
| 2.9 | | | | | | 12.0 | | |

## Proposed C/AS2 Table 5.1 Maximum permitted areas of fire resisting glazing ($m^2$) - Continued

| Table 5.1 | Maximum permitted areas of fire resisting glazing ($m^2$) /continued<br>Paragraphs 5.2.8 and 5.4.3 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Minimum distance to relevant boundary (m) | Risk groups | | | | | | | |
| | SM [1] | CA | | WB & VP<br>Professional activities, industrial activities, and intermittently occupied buildings & risk group VP | | WB<br>Storage activities | | WS |
| | Un-sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Un-sprinklered | Sprinklered | Sprinklered |
| 3.0 | | | | | | 12.0 | | |
| 3.1 | | | | | | 13.0 | | |
| 3.2 | | | | | | 14.0 | | |
| 3.4 | | | | | | 15.0[3] | | |

Notes:

1. For sprinklered *firecells* in ***risk groups*** **SM** and **SI** there is no limit on the permitted area of *fire resisting glazing.*

2. For unsprinklered *firecells* in ***risk group*** **SM** there is no limit on the permitted area of *fire resisting glazing* at distances greater than 1.7 m from the *relevant boundary*.

3. For all ***risk groups*** **other than SM** and **SI** the maximum permitted area of *fire resisting glazing* is 15 $m^2$.

## Proposed C/AS2 Table 5.2a Maximum percentage of unprotected area for external walls for risk groups SM and SI

**Table 5.2a** Maximum percentage of unprotected area for external walls for risk groups SM and SI
Paragraphs 5.2.8, 5.5.1 a), 5.5.3, 5.5.4 and 5.5.3

| Risk group | Minimum distance to relevant boundary (m)[1] | Percentage of wall area allowed to be unprotected | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Angle between wall and relevant boundary ≤ 45° | | | | Angle between wall and relevant boundary > 45° to ≤ 60° | | | | Angle between wall and relevant boundary > 60° to < 90° | | | |
| | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | |
| | | ≤ 5 | > 5 | ≤ 5 | > 5 | ≤ 5 | > 5 | ≤ 5 | > 5 | ≤ 5 | > 5 | ≤ 5 | > 5 |
| SM | < 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 35 | 30 | 70 | 60 | 45 | 33 | 90 | 66 | 55 | 35 | 100 | 70 |
| | 2 | 55 | 40 | 100 | 80 | 70 | 45 | 100 | 90 | 85 | 55 | | 100 |
| | 3 | 80 | 55 | | 100 | 95 | 65 | | 100 | 100 | 80 | | |
| | 4 | 100 | 70 | | | 100 | 90 | | | | 100 | | |
| | 5 | | 90 | | | | 100 | | | | | | |
| | 6 | | 100 | | | | | | | | | | |
| SI | < 1 | n/a | | 0 | 0 | n/a | | 0 | 0 | n/a | | 0 | 0 |
| | 1 | n/a | | 70 | 60 | n/a | | 90 | 66 | n/a | | 100 | 70 |
| | 2 | n/a | | 100 | 80 | n/a | | 100 | 90 | n/a | | | 100 |
| | 3 | n/a | | | 100 | n/a | | | 100 | n/a | | | |

**Notes:**

1. See Figure 5.3

## Proposed C/AS2 Table 5.2b Maximum percentage of unprotected area for external walls for risk group CA

| Table 5.2b | Maximum percentage of unprotected area for external walls for risk group CA<br>Paragraphs 5.2.8, 5.5.1 b), 5.5.3 and 5.5.4 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Risk group | Minimum distance to relevant boundary (m)[1] | Percentage of wall area allowed to be unprotected | | | | | | | | | | | |
| | | Angle between wall and relevant boundary ≤ 45° | | | | Angle between wall and relevant boundary > 45° to ≤ 60° | | | | Angle between wall and relevant boundary > 60° to < 90° | | | |
| | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | |
| | | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 |
| CA | < 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 20 | 20 | 40 | 40 | 20 | 20 | 40 | 40 | 23 | 20 | 46 | 40 |
| | 2 | 22 | 20 | 44 | 40 | 25 | 20 | 50 | 40 | 30 | 22 | 60 | 44 |
| | 3 | 25 | 25 | 50 | 50 | 30 | 25 | 60 | 60 | 39 | 25 | 78 | 50 |
| | 4 | 30 | 30 | 60 | 60 | 40 | 30 | 80 | 60 | 50 | 30 | 100 | 60 |
| | 5 | 40 | 30 | 80 | 60 | 50 | 30 | 100 | 60 | 64 | 40 | | 80 |
| | 6 | 45 | 35 | 90 | 70 | 60 | 40 | | 80 | 79 | 45 | | 90 |
| | 7 | 55 | 40 | 100 | 80 | 70 | 45 | | 90 | 90 | 55 | | 100 |
| | 8 | 65 | 45 | | 90 | 85 | 50 | | 100 | 100 | 65 | | |
| | 9 | 75 | 50 | | 100 | 95 | 55 | | | | 75 | | |
| | 10 | 90 | 55 | | | 100 | 65 | | | | 90 | | |
| | 11 | 100 | 65 | | | | 75 | | | | 100 | | |
| | 12 | | 70 | | | | 85 | | | | | | |
| | 13 | | 80 | | | | 95 | | | | | | |
| | 14 | | 90 | | | | 100 | | | | | | |
| | 15 | | 95 | | | | | | | | | | |
| | 16 | | 100 | | | | | | | | | | |

**Notes:**

1. See Figure 5.3

## Proposed C/AS2 Table 5.2c Maximum percentage of unprotected area for external walls for risk group WB professional activities, industrial activities, and intermittently occupied buildings and risk group VP

| Table 5.2c | Maximum percentage of unprotected area for external walls for risk group WB professional activities, industrial activities, and intermittently occupied buildings and risk group VP<br>Paragraphs 5.2.8, 5.5.1 c), 5.5.3 and 5.5.4 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Risk group | Minimum distance to relevant boundary (m)[1] | Percentage of wall area allowed to be unprotected | | | | | | | | | | | |
| | | Angle between wall and relevant boundary ≤ 45° | | | | Angle between wall and relevant boundary > 45° to ≤ 60° | | | | Angle between wall and relevant boundary > 60° to < 90° | | | |
| | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of unsprinklered firecell (m) | | Width of sprinklered firecell (m) | |
| | | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 | ≤ 10 | > 10 |
| WB VP | < 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 20 | 20 | 40 | 40 | 20 | 20 | 40 | 40 | 25 | 20 | 50 | 40 |
| | 2 | 25 | 25 | 50 | 50 | 30 | 25 | 60 | 50 | 35 | 25 | 70 | 50 |
| | 3 | 30 | 30 | 60 | 60 | 40 | 30 | 80 | 60 | 40 | 30 | 80 | 60 |
| | 4 | 40 | 35 | 80 | 70 | 50 | 35 | 100 | 70 | 50 | 40 | 100 | 80 |
| | 5 | 50 | 40 | 100 | 80 | 65 | 40 | | 80 | 60 | 50 | | 100 |
| | 6 | 60 | 50 | | 100 | 80 | 50 | | 100 | 75 | 60 | | |
| | 7 | 75 | 55 | | | 90 | 60 | | | 90 | 75 | | |
| | 8 | 90 | 60 | | | 100 | 70 | | | 100 | 90 | | |
| | 9 | 100 | 70 | | | | 80 | | | | 100 | | |
| | 10 | | 80 | | | | 90 | | | | | | |
| | 11 | | 90 | | | | 100 | | | | | | |
| | 12 | | 100 | | | | | | | | | | |

**Notes:**

1. See Figure 5.3

## Proposed C/AS2 Table 5.2d Maximum percentage of unprotected area for external walls for risk group WB storage activities

| Table 5.2d | Maximum percentage of unprotected area for external walls for risk group WB storage activities<br>Paragraphs 5.2.3, 5.5.1 d), 5.5.3 and 5.5.4 | | | | | | |
|---|---|---|---|---|---|---|---|
| Risk group | Minimum distance to relevant boundary (m)[1] | Percentage of wall area allowed to be unprotected | | | | | |
| | | Angle between wall and relevant boundary ≤ 45° | | Angle between wall and relevant boundary > 45° to ≤ 60° | | Angle between wall and relevant boundary > 60° to < 90° | |
| | | Unsprinklered firecell (Any width) | Sprinklered firecell (Any width) | Unsprinklered firecell (Any width) | Sprinklered firecell (Any width) | Unsprinklered firecell (Any width) | Sprinklered firecell (Any width) |
| WB | < 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 10 | 20 | 15 | 30 | 15 | 30 |
| | 2 | 15 | 30 | 15 | 35 | 15 | 35 |
| | 3 | 20 | 40 | 20 | 40 | 20 | 40 |
| | 4 | 20 | 45 | 25 | 50 | 25 | 50 |
| | 5 | 25 | 50 | 25 | 55 | 30 | 60 |
| | 6 | 30 | 60 | 30 | 60 | 35 | 70 |
| | 7 | 35 | 70 | 35 | 70 | 40 | 80 |
| | 8 | 40 | 80 | 45 | 90 | 50 | 100 |
| | 9 | 40 | 85 | 50 | 100 | 55 | |
| | 10 | 45 | 90 | 55 | | 65 | |
| | 11 | 50 | 100 | 60 | | 70 | |
| | 12 | 60 | | 70 | | 80 | |
| | 13 | 65 | | 80 | | 90 | |
| | 14 | 70 | | 85 | | 100 | |
| | 15 | 100 | | 100 | | | |

**Notes:**

1. See Figure 5.3

## Proposed C/AS2 Table 5.2e Maximum percentage of unprotected area for external walls for risk group WS

| Table 5.2e | Maximum percentage of unprotected area for external walls for risk group WS<br>Paragraphs 5.2.8, 5.5.1 e), 5.5.3 and 5.5.4 | | | | | | |
|---|---|---|---|---|---|---|---|
| Risk group | Minimum distance to relevant boundary (m)[1] | Percentage of wall area allowed to be unprotected | | | | | |
| | | Angle between wall and relevant boundary ≤ 45° | | Angle between wall and relevant boundary > 45° to ≤ 60° | | Angle between wall and relevant boundary > 60° to < 90° | |
| | | Width of sprinklered firecell (m) | | Width of sprinklered firecell (m) | | Width of sprinklered firecell (m) | |
| | | ≤ 20 | > 20 | ≤ 20 | > 20 | ≤ 20 | > 20 |
| WS | < 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 20 | 20 | 25 | 20 | 25 | 20 |
| | 2 | 30 | 25 | 30 | 30 | 30 | 25 |
| | 3 | 30 | 30 | 35 | 30 | 35 | 30 |
| | 4 | 35 | 35 | 40 | 35 | 40 | 35 |
| | 5 | 40 | 40 | 45 | 40 | 50 | 40 |
| | 6 | 45 | 40 | 50 | 45 | 60 | 50 |
| | 7 | 50 | 50 | 60 | 50 | 70 | 60 |
| | 8 | 60 | 55 | 65 | 60 | 85 | 65 |
| | 9 | 65 | 60 | 80 | 65 | 100 | 75 |
| | 10 | 70 | 65 | 90 | 75 | | 90 |
| | 11 | 80 | 70 | 100 | 80 | | 100 |
| | 12 | 90 | 80 | | 90 | | |
| | 13 | 100 | 85 | | 100 | | |
| | 14 | | 95 | | | | |
| | 15 | | 100 | | | | |

**Notes:**

1. See Figure 5.3

## Proposed C/AS2 Table 5.3 Maximum size of largest permitted single unprotected area in external walls

| Table 5.3 | Maximum size of largest permitted single unprotected area in external walls<br>Paragraphs 5.2.8, 5.5.5 and 5.5.6 | | | | |
|---|---|---|---|---|---|
| Risk group | Minimum distance to relevant boundary (m)[1] | Unsprinklered firecell | | Sprinklered firecell | |
| | | Maximum largest single unprotected area ($m^2$) | Minimum distance to adjacent unprotected areas ($m^2$) | Maximum largest single unprotected area ($m^2$) | Minimum distance to adjacent unprotected areas ($m^2$) |
| SM | **1** | 1.0 | 1.0 | 15 | 1.5 |
| | **2** | 6.0 | 1.5 | 35 | 2.5 |
| | **3** | 13 | 4.5 | 60 | 3.5 |
| | **4** | 20 | 5.5 | 69 | 4.0 |
| | **5** | 29 | 6.5 | 139 | 4.5 |
| | **6** | 40 | 7.5 | No restriction | No restriction |
| SI | **1** | n/a | n/a | 15 | 1.5 |
| | **2** | n/a | n/a | 35 | 2.5 |
| | 3 | n/a | n/a | 60 | 3.5 |
| CA<br>WB<br>VP | 1 | 1.0 | 0.5 | 15 | 1.5 |
| | 2 | 4.0 | 1.0 | 35 | 2.5 |
| | 3 | 10 | 5.0 | 60 | 3.5 |
| | 4 | 16 | 7.0 | 96 | 4.0 |
| | 5 | 23 | 8.0 | 139 | 4.5 |
| | 6 | 31 | 8.5 | No restriction | No restriction |
| | 7 | 40 | 9.5 | No restriction | No restriction |
| | 8 | 51 | 11 | No restriction | No restriction |
| | 9 | 64 | 13 | No restriction | No restriction |
| | 10 | 77 | 13.5 | No restriction | No restriction |
| WS | 1 | n/a | n/a | 15 | 1.5 |
| | 2 | n/a | n/a | 35 | 2.5 |
| | 3 | n/a | n/a | 60 | 3.5 |
| | 4 | n/a | n/a | 96 | 4.0 |
| | 5 | n/a | n/a | 139 | 4.5 |
| | 6 | n/a | n/a | No restriction | No restriction |

**Notes:**

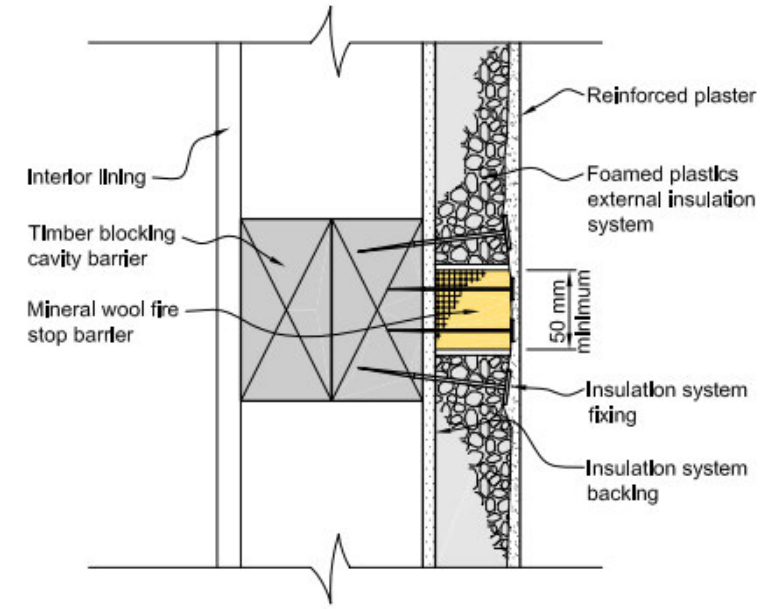
1. See Figure 5.3

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **5.6.1** …<br>*a) Fire* rating (for fire exposure from below) that part of the roof within 1.0 m of the *relevant boundary*. The *FRR* shall be based on the *property rating* for the *firecell*, except that *insulation* is not required, or<br>b) Extending the wall, being a *fire separation* along or adjacent to the *relevant oundary*, no less than 450 mm above the roof to form a parapet. | **5.6.1** …<br>a) *Fire* rating (for fire exposure from below) that part of the roof within 1.0 m of the *relevant boundary*. The *FRR* shall be based on the *property rating* for the *firecell*, except that *insulation* is not required, or<br>b) Extending the wall, being a *fire separation* along or adjacent to the *relevant boundary*, no less than 450 mm above the roof to form a parapet. | **C/AS2 Item 7: Editorial**<br>a) is not part of the defined term and is proposed not to appear in italics. The defined term "relevant boundary" has a typo and is missing the letter b and is proposed to be corrected. |
| **5.6.5** If the *external wall*, on its own, is not required to have an *FRR*, but roof eaves extend to within 650 mm of the *relevant boundary*, the total eaves *construction* and the *external wall* from which they project shall have *FRRs* in accordance with Paragraph 2.3 (see Figure 5.4). | **5.6.5** If the *external wall*, on its own, is not required to have an *FRR*, but roof eaves extend to within 650 mm of the *relevant boundary*, the total eaves *construction* and the *external wall* from which they project shall have *FRRs* in accordance with Paragraph 2.3 (see Figure 5.4). Eaves *construction* includes the guttering or spouting and any other projections from the eaves, although guttering or spouting need not be *fire* rated. | **C/AS2 Item 5: Control of horizontal fire spread**<br>This text is proposed to be amended to include additional clarity for the construction and fire rating of eaves. This text was previously found in a comment in Acceptable Solution C/AS5 Amendment 4 2017 and is proposed to be included as part of the requirement. |
| **5.7.6** *c) Exitways…*<br>**5.7.8** *b) Constructing…* | **5.7.6** c) *Exitways…*<br>**5.7.8** b) *Constructing…* | **C/AS2 Item 7: Editorial**<br>This proposal will correct the formatting on letters c) and b) which are shown in italics but are not part of the defined term. |
| **Figure 5.6 Vertical fire spread for external walls and roofs**<br><br>(b) By providing sprinklers in the firecell below the roof. | **Figure 5.6 Vertical fire spread for external walls and roofs**<br><br>(b) By providing sprinklers throughout the *building* below the roof. | **C/AS2 Item 5: Control of external fire spread**<br>The text in the figure is proposed to be amended to reflect the requirement in Paragraph 5.7.8 a). |

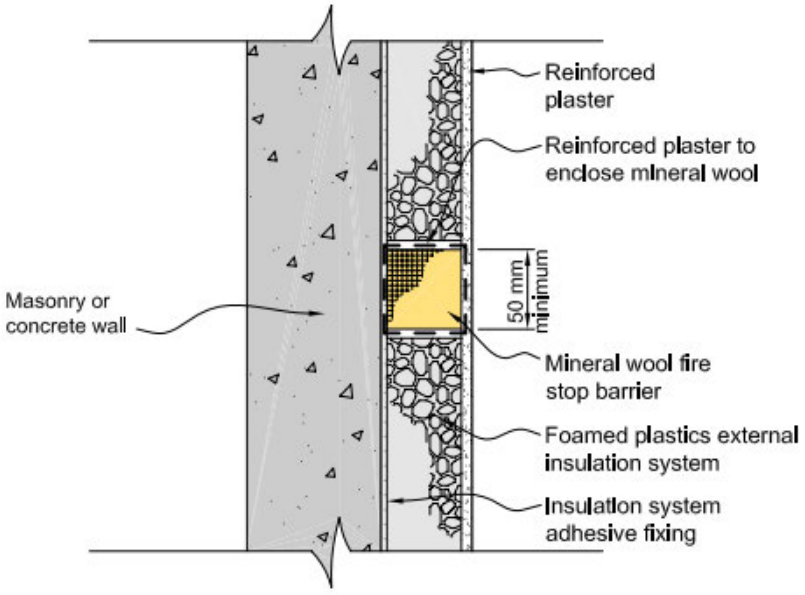
| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| External thermal insulation on walls in multi-storey buildings<br>5.7.17 *Buildings* of three or more floors with an *external wall* cladding system incorporating an externally applied *combustible* insulant shall have horizontal *fire stop* barriers installed in the cladding system at intervals of not more than two floors. For framed wall systems a barrier shall be *constructed* within the framed cavity, and a *fire stop* barrier shall be *constructed* at the same level within the cladding system. An acceptable detail for barriers is shown in Figure 5.8. This requirement does not apply to *combustible* insulant positioned between studs and dwangs/nogs in a conventional framed wall system.<br>5.7.18 Paragraph 5.7.17 applies where the floors are *fire separations* between *firecells*.<br>It does not apply to any *external wall* satisfying the test requirements of Paragraph 5.8.2 b).<br><br>**Figure 5.8 Barriers to vertical fire spread in foamed plastics external insulation systems**<br>[Refer to the figure on the following page] | Delete Paragraphs 5.7.17 and 5.7.18, and Figure 5.8 | **C/AS2 Item 4: Cladding**<br>The construction detail provided for EIFS (exterior finish and insulation systems) in Paragraph 5.7.17 and Figure 5.8 no longer accurately reflects current construction practice for this type of installation. The requirement pre-dates modern construction methods including the use of drained cavities for demonstrating compliance with E2.<br>Additionally, the ability of this installation to demonstrate compliance with the external wall cladding system requirements in Paragraph 5.8 (and NZBC Clauses C3.5 and C3.7) is also questionable due to the use of combustible material and the use of blocking at two floors instead of every one floor.<br>At this time, the continued inclusion of this detail in the Acceptable Solution is not supported and it is proposed to remove these paragraphs and figure. |

## Current C/AS2 Figure 5.8 Barriers to vertical fire spread in foamed plastics external insulation systems [To be removed]

**Figure 5.8** **Barriers to vertical fire spread in foamed plastics external insulation systems**
Paragraph 5.7.17




**(a) Framed cavity wall construction**




**(b) Concrete or masonry wall construction**

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **5.8 External cladding systems**<br>**External walls**<br>**5.8.1** Substantive components in the *external wall* cladding system shall be as per Table 5.5 tested in accordance with the relevant *standard test* in Appendix C C7.1<br>5.8.2 The requirements in Paragraph 5.8.1 do not apply if:<br>a) *Surface finishes* are no more than 1 mm in thickness and applied directly to a *non-combustible* substrate, or<br>b) The entire wall assembly has been tested at full scale in accordance with NFPA 285 and has passed the test criteria.<br><br>**5.8.3** If a building has *firecells* containing different *risk groups*, the acceptable peak *heat release rate* and total heat released of an *external wall* cladding system may have different values provided that:<br>a) For each *risk group* the value is no greater than required by Paragraph 5.8.1 for the *building height* (not just the height of the *firecell*), and<br>b) The value applied to a *firecell* is no greater than required by any *firecells* at a higher level on that wall. | **5.8 External cladding systems**<br>**External wall materials**<br>**5.8.1** Where *external walls* are located less than 1.0 m from a *relevant boundary*, all substantive components in the *external wall* cladding system shall be:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) tested in accordance with the relevant *standard test* in Appendix C C7.1 and achieve a Type A classification.<br>**5.8.2** For *buildings* containing ***risk group* SI**, where *external walls* are located more than 1.0 m from a *relevant boundary*, substantive components in the *external wall* cladding system shall be:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) tested in accordance with the relevant *standard test* in Appendix C C7.1 and achieve a Type A or Type B classification.<br><br>**External wall assemblies for buildings with a building height ≥ 10 m**<br>**5.8.3** Except where permitted in Paragraph 5.8.4, the entire *external wall* assembly (including the cladding system, *external wall* framing and any insulation) shall be:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) classified in accordance with AS 5113 and achieve a EW classification; or | **C/AS2 Item 4: Cladding**<br>The basis of the previous cladding requirements for classification as Type A and Type B stems from research in the late 1980s and early 1990s including tests conducted by BRANZ, the National Research Council Canada and Forintek (now called FPInnovations). These classifications pre-date modern construction of buildings with drained cavities for higher building heights, the adoption of quantitative performance C Clauses in the NZBC and the expanded understanding of the associated fire risks with modern façade construction. Small scale testing is not appropriate for situations at higher risk of external vertical fire spread.<br><br>To replace the reliance on small scale testing, the number of applicable cited large scale tests are proposed to be expanded. These test standards were previously cited in the guidance document "Fire performance of external wall cladding systems". When considering adopting relevant test or classification standards developed overseas, no fire test is perfect and each comes with its own limitations. It is important to consider how each standard fits within the local building construction system and how the performance of a building is measured holistically. Other jurisdictions may adopt test |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | c) tested in accordance with BS 8414-1 and satisfy the acceptance criteria in BR 135; or<br>d) tested in accordance with BS 8414-2 and satisfy the acceptance criteria in BR 135; or<br>e) tested in accordance with NFPA 285 and pass, and have all substantive components in the *external wall* cladding system:<br>i) comprised of *non-combustible* or *limited combustible* materials; or<br>ii) tested in accordance with the relevant *standard test* in Appendix C C7.1 and achieve a Type A classification.<br><br>**5.8.4** Where the *building* is sprinklered and the *building height* is less than 25 m, the requirements of Paragraph 5.8.3 do not apply provided that all substantive components in the *external wall* cladding system are:<br>a) comprised of *non-combustible* or *limited combustible* materials; or<br>b) tested in accordance with the relevant *standard test* in Appendix C C7.1 and achieve a Type A classification. | standards along with a suite of prescriptive requirements that relax or tighten certain aspects of construction. These additional prescriptive requirements enhance the regulations beyond the simple citation of a fire test standard. When considering the previously cited NFPA 285 test, research indicates that during this test the heat fluxes from the external venting flames to the façade materials are less than other large scale tests. Without additional regulations around the use of this test, there may be unintended consequences where the fire test is not severe enough to challenge the performance of all components in the assembly. Thus, further restrictions around the materials in the assembly are required to ensure an appropriate result is maintained. |
| **Table 5.5 External cladding systems**<br>[Refer to the current table on the following page] | **Delete**<br><br>**Table C1.3 Classification of materials in external wall cladding systems**<br>[Refer to the proposed table on the following pages] | **C/AS2 Item 4: Cladding**<br>With the proposed changes to cladding requirements, Table 5.5 no longer references the current fire performance requirements for external wall cladding systems. The applicable classification values that are still relevant from |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | | Table 5.5 (Type A and Type B) are proposed to be included in Appendix C in the proposed Table C1.3 as this location is more appropriate for fire testing requirements. |
| | **5.8.5** The spread of fire through cavities in an *external wall* shall be avoided by providing *cavity barriers* at each floor level. *Cavity barriers* shall comply with the requirements in Paragraphs 4.14.3 to 4.14.5. | **C/AS2 Item 4:**<br>Cavity barriers are already required in concealed spaces including external walls as required in the proposed Paragraph 4.14. This proposed change reinforces that an external wall cavity requires protection as a concealed space.<br>The provision of cavity barriers within external wall cladding systems are required to demonstrate compliance with NZBC Performance Clause C3.5. Clause C3.5 is intended to reduce the risk of flame spread and limit it to 3.5 m vertically. To achieve this, cavity barriers are required at every floor level. |

## Current C/AS2 Table 5.5 External cladding systems [To be removed]

| **Table 5.5** | **External cladding systems**<br>**Paragraph 5.8.1** | |
|---|---|---|
| **Building height** | **Distance to boundary < 1.0 m** | **Distance to boundary ≥ 1.0 m** |
| **Single level** | Type A | No Requirement |
| **≤ 10 m** | Type A | Type B for ***risk group* SI**<br>No requirement for other *risk groups* |
| **> 10 m** | Type A | Type A |
| **Cladding type** | Peak heat release rate (kW/m$^2$) | Total heat released (MJ/m$^2$) |
| **Type A** | 100 | 25 |
| **Type B** | 150 | 50 |

**Notes:**

1. The maximum permitted radiation flux criteria specified in the NZBC assume claddings within 1.0 m of the relevant boundary will not ignite.

2. Determined by testing to ISO 5660 or AS/NZS 3837 at an irradiance of 50 kW/m$^2$ for a duration of 15 minutes.

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| **C/AS2 Part 6 Firefighting** | | |
| **6.1 Fire and Emergency New Zealand vehicular access**<br>**6.1.1** If *buildings* are located remotely from the street boundaries of a property, pavements situated on the property and likely to be used by Fire and Emergency New Zealand vehicles to reach a hard-standing shall:<br>a) 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<br>b) Be trafficable in all weathers, and<br>c) Have a minimum width of 4.0 m, and<br>d) 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*, and<br>e) Provide access to a hard-standing from which there is an unobstructed path to the *building* within 20 m of:<br>i) the firefighter access into the *building*,<br>and<br>ii) the inlets to *fire* sprinkler systems or *building fire* hydrant systems, where these are installed.<br>6.1.2 For *risk group* SI only, the following requirements shall be met in addition to those in Paragraph 6.1.1:<br>a) Roadway pavements shall withstand a vehicle of | **6.1 Fire service vehicular access**<br>**6.1.1 Fire service vehicular access way**<br>**6.1.1** Where a building is provided with one or more hard-standings that are not the carriageway of a public road in order to satisfy Paragraphs 6.2.1 to 6.2.3, access to these hard-standings shall be provided by fire service vehicular access ways that meet the requirements of Paragraphs 6.1.2 to 6.1.4.<br>6.1.2 A fire service vehicular access way used to satisfy Paragraph 6.1.1 may be part of the public road. 6.1.3 When not part of the public road, a fire service vehicular access way used to satisfy Paragraph 6.1.1 shall:<br>a) 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 road serving the property, whichever is the lower, and<br>b) be trafficable in all weather, and<br>c) have a clear passageway of at least:<br>i) 3.5 m wide at site entrances, internal entrances and between buildings, and<br>ii) 4.0 m wide elsewhere along the vehicular access way, and<br>d) have a minimum height clearance of 4.0 m throughout, and | **C/AS2 Item 6: Firefighting**<br>The requirements for fire service vehicular access are proposed to be expanded to ensure clear height throughout, and requirements for bends, slopes, dead ends, kerbs and traffic calming features.<br>Requirements for a hardstanding are also proposed to be added.<br>How to measure the hose run distance, and thereby determine whether the building may require a building hydrant, has been specified in the proposal.<br>Features for firefighter building access area also proposed. Access to alarm panels, hydrant and sprinkler inlets have been proposed to align with requirements from relevant standards. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| multiple axles spaced at no less than 2.5 m centres, and each carrying 8.2 tonnes, and<br>b) Where a property includes two or more *buildings*, any one of which has a *building height* greater than 7.0 m, roadway widths shall be no less than 6.5 m, corners and bends shall have a minimum radius of 12.5 m and turning areas shall be a minimum of 25 m from wall to wall, and<br>c) Hard-standings shall be provided adjacent to any *building* having a *building height* greater than 7.0 m.<br>6.1.3 For *risk group* SI only, the location and extent of hard-standings shall be determined in consultation with Fire and Emergency New Zealand.<br>**6.2 Information for firefighters**<br>**6.2.1** If *fire* alarm or sprinkler systems are installed, the control panel shall be located in a position close to the Fire and Emergency New Zealand attendance point and in accordance with NZS 4512, NZS 4515 and NZS 4541 as appropriate | e) have corners and bends with a minimum inner radius of 6.3 m, and a minimum outer radius of 11.3 m, and<br>f) be provided with a turnaround with a 25 m turning circle, where a cul-de-sac on the fire service vehicular access way exceeds 90 m in length, and<br>g) not have kerbs that are higher than 250 mm and not have obstructions within 300 mm of a kerb face, and<br>h) have a gradient no steeper than 1:8, reduced to 1:16 for the first and last 4.0 m of any section steeper than 1:16 to provide a smooth transition on entry/exit<br>**6.1.4** Security features (such as gates or barriers) and traffic calming devices shall not be used across the fire service vehicular access way unless specifically approved by Fire and Emergency New Zealand.<br>**6.2 Hard-standings**<br>**6.2.1** Buildings shall be provided with at least one hard-standing.<br>**6.2.2** Buildings may be provided with additional hard-standings to provide a means of satisfying the Type 18 fire safety system requirements of Table 2.2a-d without providing a building hydrant system.<br>**6.2.3** A section of the carriageway of a public road may be a hard-standing for the purposes of Paragraph 6.2.1 or 6.2.2, as long as the | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | building satisfies Paragraphs 6.2.4 to 6.2.6.<br>**6.2.4** The building shall be less than 20 m in distance from each hard-standing that is necessary to satisfy Paragraphs 6.2.1 and 6.2.2, measured between the closest points in each case. The building shall also be more than 5.0 m from each hard-standing that is not the carriageway of a public road.<br>**6.2.5** The firefighter building access point shall be located within 20 m of at least one hard-standing.<br>**6.2.6** An access route into the building shall be located within 20 m of each additional hard-standing that is necessary to satisfy Paragraphs 6.2.1 and 6.2.2.<br>**6.2.7** All hard-standings that are necessary to satisfy Paragraphs 6.2.1 and 6.2.2 and are not the carriageway of a public road shall<br>a) comply with the requirements of Paragraphs 6.1.3 a), b) and g), and<br>b) have a plan area that will contain a rectangle of at least 4.0 m wide and 15 m long, and<br>c) have a gradient no steeper than 1:50 in any direction, and<br>d) have no roof and no overhead obstructions along its entire area.<br>**6.2.8** All hard-standings that are necessary to satisfy Paragraphs 6.2.1 and 6.2.2 shall be located within 135 m of a pressurised water supply, or within 10 m from an open | |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| | or static water source. This distance shall be measured taking into consideration obstructions to directly laying out a hose run, such as buildings, fences, waterways and storage or parking areas, and shall not contain any sharp angles.<br>**6.2.9** Where a Type 18 building hydrant system is installed, the distance from the hard-standing to the building hydrant inlet shall not exceed 20 m. This distance shall be measured taking into consideration obstructions to directly laying out a hose run, such as buildings, fences, waterways and storage or parking areas, and shall not contain any sharp angles.<br>**6.3 Hose run**<br>**6.3.1** The hose run distance referred to in Tables 2.2a through 2.2d is to be measured from the hard-standing to the furthest point in the building as follows:<br>(a) the hose run distance shall be measured along an access route, and<br>(b) the measured hose run distance shall avoid any security features that prevent free access except:<br>(i) security features that automatically deactivate and unlock in the event of a fire, and/or<br>(ii) a door at the final exit that need not automatically unlock in the event of a fire, and<br>(c) the measured hose run distance shall take into account obstructions such as | |

| Current text | Proposed text | Explanation and justification for change |
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| | internal and external partitions, fittings, furniture, storage and machinery, and<br>(d) the hose run distance shall not contain any sharp angles.<br>**6.4 Firefighter building access**<br>**6.4.1** The main entrance to the building shall be the firefighter building access point unless an alternative entrance is specifically approved by Fire and Emergency New Zealand to serve as firefighter building access point. The existence and clear directions to the location of any such alternative entrance serving as the firefighter building access point shall be clearly indicated at the main entrance to the building from the public road.<br>**6.4.2** The firefighter building access point shall be able to be readily accessed by the fire service.<br>**6.4.3** In unsprinklered buildings, the firefighter building access shall be protected from falling glass by a rigid canopy. The canopy shall be 2.0 m deep and extend across the full width of the firefighter building access point door plus an extra 0.5 m either side.<br>**Stairwells**<br>**6.4.4** Stairwells shall be numbered inside the stairwell at each entrance to a floor to indicate the floor level within the building in accordance with NZBC Clause F8. These numbers, and those used for position indicator numbering | |

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| | in all lifts installed in the building, shall be consistent in their description of each floor. | |
| **6.2.2** If *hazardous substances* are present in the *building,* warning signage in accordance with F8/AS1 shall be displayed. | **Hazardous substances**<br>**6.4.5** If hazardous substances will be present in the building, warning signage in accordance with NZBC Clause F8 shall be displayed. | |
| **6.3 Firefighting facilities**<br>**6.3.1** The control features of fire safety systems shall be located at a position with ready access from street level and protected from the effects of fire including debris falling from upper floors.<br>Fire hydrant system<br>**6.3.2** Building fire hydrant systems shall be installed as specified in Paragraph 2.2 and shall meet the requirements of NZS 4510. | **6.5 Fire safety systems**<br>**6.5.1** The fire service inlets and indicating units for the fire safety systems installed in the building shall:<br>a) be located so they can be accessed from outside the building, and<br>b) be located within 15 m of the firefighter building access point, and<br>c) be located no more than 20 m from the hard-standing associated with the firefighter building access point, and<br>d) be clearly visible from the hard-standing associated with the firefighter building access point, and<br>e) be on the same storey as the firefighting building access and/or the hard-standing associated with the firefighter building access point, and<br>f) have the fire alarm system indicating unit located within 5 m laterally of the fire service inlets for the building hydrant and/or sprinkler systems.<br>**6.5.2** Fire service inlets for building hydrants and/or sprinklers shall be placed in an enclosure as required by NZS 4510, NZS 4515 and/or NZS 4541, as applicable, and | |

| Current text | Proposed text | Explanation and justification for change |
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| | (a) for building hydrants, where the door of the enclosure is on a glazed exterior wall of a multi-storey building, protection from falling glass shall be provided by a veranda or other overhead assembly extending at least 1 m in front and 1 m either side of the enclosure, and<br>(b) for sprinklers, where the door of the enclosure is on an exterior wall of a multi-storey building protection from building elements and other objects falling from above shall be provided by a veranda or other overhead assembly extending at least 1 m in front and 1 m either side of the enclosure.<br>**6.5.3** The installation of the fire alarm indicating unit shall allow the fire service to have unimpeded access for the operation of all controls. | |
| **Fire and Emergency New Zealand lift control**<br>6.3.3 Fire and Emergency New Zealand lift control is required if the escape height exceeds 10 m. The control of lifts under fire conditions shall comply with NZS 4332. | **6.6 Lift control**<br>**6.6.1** In buildings which require a Type 15 fire safety system, upon activation of the fire alarm system all lifts which are not operating on inspection service shall return non-stop to, and remain parked at, with the doors open, the floor at the same level as the Fire and Emergency New Zealand firefighter building access.<br>If the fire is detected on the same level as the Fire and Emergency New Zealand firefighter building access, the lifts shall return in the manner | |

| Current text | Proposed text | Explanation and justification for change |
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| | described to one floor above this level.<br>**6.6.2** Lifts in buildings which require a Type 15 fire safety system shall be fitted with recall features which meet the requirements of NZBC Clause D2. | |
| **C/AS2 Part 7 Prevention of fire occurring** | | |
| **7.2 Gas-burning appliances**<br>**7.2.1** For gas-burning appliances AS/NZS 5601.1 sections 6.7, 6.8 and 6.9 and Appendix H are Acceptable Solutions for the construction and installation of flues and sections 5.11, 6.2, 6.3 and 6.10 are Acceptable Solutions for the installation of appliances, with the modifications given in Paragraph 7.2.2.<br>**7.2.2 Modifications to AS/NZS 5601.1**<br>Delete Paragraph 6.2.11 and substitute the following:<br>"6.2.11 Seismic restraint<br>Seismic restraint of appliances installed in buildings shall be designed in accordance with B1/VM1 Paragraphs 2.0 and 13.0."<br>Add a Note to 6.4 as follows:<br>"Ventilation requirements are contained in Acceptable Solution G4/AS1. The ventilation requirements of this Standard may exceed the performance requirements of NZBC G4. | **7.2 Gas-burning appliances**<br>**7.2.1** Gas-burning appliances must be installed in accordance with NZBC Clause G11. | **C/AS2 Item 7: Editorial**<br>This proposal removes specific requirements for the installation of gas-burning appliances and instead references NZBC Clause G11. Clause G11 contains an equal set of measures and removing the specific requirements in C/AS2 ensures the requirements do not conflict. |
| **7.4 Downlights**<br>**7.4.1** For risk group SM only, recessed luminaires in residential occupancies shall be one of the following types, | **7.4 Electrical fire safety**<br>**7.4.1** Electrical installations in *buildings* must be installed in accordance with NZBC Clause G9. | **C/AS2 Item 7: Editorial**<br>This proposal removes the specific requirements for downlights as the current text is outdated, overly restrictive |

| Current text | Proposed text | Explanation and justification for change |
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| as specified in AS/NZS 60598.2.2:<br>a) IC-F, or<br>b) IC, or<br>c) CA-80, or<br>d) CA-135.<br>Full compliance can only be achieved if the installation of the luminaire is in accordance with AS/NZS 60598.2.2.<br>7.4.2 In occupancies other than residential, recessed luminaires shall be installed with clearances from building elements including insulation of 100 mm. | | (new lamp types are not listed and thus not allowed) and not in line with industry practise and other legislation. To avoid duplication and conflicting requirements, it is proposed to reference the NZBC Clause G9 Electricity which contains appropriate requirements for electrical fire safety. |
| **C/AS2 Appendix A (normative): Fire safety systems** | | |
| **Type 15 – Fire and Emergency New Zealand Lift Control**<br>The control of lifts under fire conditions shall comply with NZS 4332. | **Type 15 – Fire and Emergency New Zealand Lift Control**<br>The control of lifts under fire conditions shall comply with NZBC Clause D2. | **C/AS2 Item 7: Editorial**<br>This proposal removes reference to NZS 4332 and replaces it with reference to NZBC Clause D2. Clause D2 contains requirements for lift control and permits the use of NZS 4332 or EN81-20, as amended in D2/AS1. This gives lift manufacturers more options to demonstrate compliances and ensures the compliance pathway does not conflict between the code clauses. |
| **C/AS2 Appendix C (normative): Test methods** | | |
| **C4.1.1 Combustibility test**<br>Materials shall be classified as *non-combustible* or *combustible* when tested to AS 1530 Methods for fire tests on building materials and structures – Part 1: Combustibility test for materials. | **C4.1.1 Combustibility test**<br>Materials shall be classified as:<br>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<br>b) *non-combustible* when classified as A1 in accordance | **C/AS2 Item 4: Cladding**<br>The classification of material combustibility is proposed to be amended to include references to BS EN 13501-1 which is cited in the proposed definitions for non-combustible and limited combustible. |

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| | 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<br>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. | |
| **C7.1 Fire properties of external wall cladding systems**<br>**C7.1.1** *Fire* properties of materials in *external wall* cladding systems shall be determined in accordance with: ISO 5660 Reaction-to-fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method).<br>**C7.1.2** In addition to meeting the general requirements of ISO 5660 Part 1, testing shall be in accordance with the following specific requirements:<br>a) An applied external heat flux of 50 kW/m$^2$, and<br>b) A test duration of 15 minutes, and<br>c) The total heat release measured from start of the test, and<br>d) Sample orientation horizontal, and<br>e) Ignition initiated by the external spark igniter.<br>**C7.1.3** Timber claddings which have a *fire retardant* treatment incorporated in or | **C7.1 Fire properties of materials in external wall cladding systems**<br>**C7.1.1** Materials in *external wall* cladding systems shall be classified using the values in Table C1.3 when tested in accordance with:<br>a) ISO 5660 Reaction-to-fire tests – Heat release, smoke production and mass loss rate – Part 1: Heat release rate (cone calorimeter method), or<br>b) AS/NZS 3837 Method of test for heat and smoke release rates for materials and properties using an oxygen consumption calorimeter.<br>**C7.1.2** In addition to meeting the general requirements of ISO 5660 Part 1 or AS/NZS 3837, testing shall be in accordance with the following specific requirements:<br>a) an applied external heat flux of 50 kW/m$^2$, and<br>b) a test duration of 15 minutes, and<br>c) the total heat release measured from start of the test, and | **C/AS2 Item 4: Cladding**<br>The proposed change to this section provides further clarity that small scale testing is relevant only when considering materials and is not an evaluation method for cladding systems. Furthermore, this section is proposed to include the relevant testing and classifications previously located in Table 5.5. C7.1.4 is also proposed to be deleted from this section as it is redundant to the requirements found in Paragraph 5.8. |

| Current text | Proposed text | Explanation and justification for change |
|---|---|---|
| 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 C7.1.1.<br>**C7.1.4** *External wall* cladding systems which comprise only materials which individually are classified as *non-combustible* may be deemed to satisfy all the requirements of Paragraph 5.8.1.<br>**C7.1.5** 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 C7.1.2 without the metal facing present. | d) sample orientation horizontal, and<br>e) ignition initiated by the external spark igniter.<br>**C7.1.3** Timber cladding 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 C7.1.1.<br>**C7.1.4** 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 C7.1.2 without the metal facing present. | |

## Proposed C/AS2 Table C1.3 Classification of materials in external wall cladding systems

| Table C1.3 | Classification of materials in external wall cladding systems | |
|---|---|---|
| **Cladding material type** | **Peak heat release rate (kW/m²)** | **Total heat released (MJ/m²)** |
| **Type A** | ≤ 100 | ≤ 25 |
| **Type B** | ≤ 150 | ≤ 50 |

# E1 Surface Water

**MBIE proposes to amend Acceptable Solution E1/AS1, Verification Method E1/VM1, and issue a new Acceptable Solution E1/AS2.**

1. **E1/AS2:** Issue a new Acceptable Solution which references AS/NZS 3500.3 *Stormwater drainage*, with modifications, as a means of compliance with NZBC clause E1 *Surface Water*
2. **Rainfall intensities:** Amend E1/AS1 Appendix A to replace the rainfall intensity maps with a table that provides location specific rainfall intensity data
3. **Referenced Standards:** Amend E1/VM1 and E1/AS1 to update references to product manufacturing Standards
4. **Editorial:** Correct a spelling mistake in E1/AS1

## Item 1 – E1/AS2: Issue a new Acceptable Solution which references AS/NZS 3500.3 *Stormwater drainage*, with modifications, as a means of compliance with NZBC clause E1 *Surface Water*

MBIE propose to issue a new Acceptable Solution as a means of compliance with NZBC clause E1 *Surface Water*. E1/AS2 will reference AS/NZS 3500.3:2018 *Stormwater drainage,* with modifications, as an Acceptable Solution for surface water drainage installations.

This new Acceptable Solution is intended to:

- Increase 'deemed to comply' options for sizing and designing roof gutters and surface water drainage systems
- Introduce new 'deemed to comply' design and installation solutions for:
  - on-site stormwater detention systems (partial solution)
  - pumped stormwater systems
  - siphonic roof water drainage systems
- Introduce informative installation provisions for subsoil drainage systems
- Provide 'deemed to comply' design and installation solutions for surface water and roof water drainage systems that fall outside the scope of the current Verification Method and Acceptable Solution
- Allow for consenting efficiency when stormwater drainage systems are designed using AS/NZS 3500.3:2018 as the design would no longer need to be treated as an Alternative Solution by Building Consent Authorities

A number of modifications to AS/NZS 3500.3:2018 *Stormwater drainage* are proposed to be included within E1/AS2 to reduce inconsistencies with the performance criteria of NZBC clause E1, requirements within E1/AS1 and accepted industry practice.

| Current Text | Proposed text |
|---|---|
| **E1 References** | |
| **References E1/VM1 & AS1**<br>For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in this Verification Method and Acceptable Solution (primary reference documents) must be the editions, along with their specific amendments, listed below. Where these primary reference documents refer to other Standards or documents (secondary reference documents), which in turn may also refer to other Standards or documents, and so on (lower-order reference documents), then the version in effect at the date of publication of this Verification Method and Acceptable Solution must be used. | **References E1/VM1 & AS1/AS2**<br>For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in this Verification Method and Acceptable Solutions (primary reference documents) must be the editions, along with their specific amendments, listed below. Where these primary reference documents refer to other Standards or documents (secondary reference documents), which in turn may also refer to other Standards or documents, and so on (lower-order reference documents), then the version in effect at the date of publication of this Verification Method and Acceptable Solutions must be used. |
| | AS/NZS 3500:- Plumbing and drainage<br>Part 3: 2018 Stormwater drainage<br><br>Where quoted:<br>AS2 1., 1.0.1, 1.0.4 |
| **E1 Definitions** | |
| **Definitions E1/VM1 & AS1** | **Definitions E1/VM1 & AS1/AS2** |

| Current Text | Proposed text |
|---|---|
| This is an abbreviated list of definitions for words or terms particularly relevant to this Verification Method and Acceptable Solution. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook. | This is an abbreviated list of definitions for words or terms particularly relevant to this Verification Method and Acceptable Solutions. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook. |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| **E1/AS2** | |
| **Acceptable Solution E1/AS2**<br>**Stormwater drainage**<br>**1.0 AS/NZS 3500.3 Stormwater drainage**<br>**1.0.1** AS/NZS 3500.3, as modified by paragraph 1.0.4, is an Acceptable Solution for the design and installation of *surface water* drainage systems.<br>**1.0.2** This Acceptable Solution is limited to *buildings* and sitework where *surface water* results only from rainfall, and which are:<br>a) Free from a history of flooding,<br>b) Not adjacent to a watercourse,<br>c) Not located in low lying area, and<br>d) Not located in a secondary flow path<br>**1.0.3** *Buildings* to which this Acceptable Solution is applied shall comply with the requirements of Acceptable Solution E1/AS1 Section 2.0 - Minimum Acceptable Floor Level.<br>**1.0.4** Modifications to AS/NZS 3500.3 | |
| **Clause 1.2.2** Delete and replace with: "This Standard shall be read in conjunction with the New Zealand Building Code (NZBC) in New Zealand. This Standard may be used for compliance with NZBC clause E1 Surface Water, in accordance with Acceptable Solution E1/AS2.<br>Where alternative New Zealand Standards are referenced (e.g. NZS 5807) the New Zealand Standard shall be used for New Zealand only." | **1 Scope and general**<br>**1.2 Application**<br>**1.2.2 New Zealand**<br>This Standard shall be read in conjunction with the New Zealand Building Code (NZBC) in New Zealand. This Standard may be used for compliance with NZBC clause E1 Surface Water, in accordance with Acceptable Solution E1/AS2 ~~the New Zealand Building Code Paragraph G12, Water Supplies~~.<br>Where alternative New Zealand Standards are referenced (e.g. NZS 5807) the New Zealand Standard shall be used for New Zealand only. |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
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| **Clause 3.3.5.2** Delete and replace with: "Ten minutes duration rainfall intensity (in mm/h) for New Zealand shall be determined for ARIs of 10 years and 50 years using rainfall frequency duration information available from:<br>(a) the local territorial authority,<br>(b) the National Institute for Water and Atmospheric Research (NIWA), or<br>(c) Acceptable Solution E1/AS1 Appendix A.<br>NOTE: Rainfall intensity data is available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS).<br>HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also provides projections of future rainfall intensities for various climate change scenarios." | **3 Roof drainage systems — Design**<br>**3.3 Meteorological criteria**<br>**3.3.5 Rainfall intensity**<br>**3.3.5.2 New Zealand**<br>Ten minutes duration rainfall intensity (in mm/h) for New Zealand shall be determined for ARIs of 10 years and 50 years~~, from Appendix F. NOTE: Guidelines for the determination of rainfall intensity are given in Appendix D.~~ using rainfall frequency duration information available from:<br>(a) the local territorial authority,<br>(b) the National Institute for Water and Atmospheric Research (NIWA), or<br>(c) Acceptable Solution E1/AS1 Appendix A .<br>NOTE: Rainfall intensity data is available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS).<br>HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also provides projections of future rainfall intensities for various climate change scenarios. |
| **Clause 3.4.5** Insert: "NOTE 4: Acceptable Solution E2/AS1 allows for the use of spreaders for roof catchment areas up to 25 m² in some situations." | **3 Roof drainage systems — Design**<br>**3.4 Catchment area**<br>**3.4.5 Higher catchment area**<br>Stormwater from a higher catchment area shall be discharged directly to a rainhead or the sump shall be sized in accordance with this Standard.<br>Alternatively, a spreader may be used subject to the following:<br>(a) For a tiled roof, the lower section shall be sarked a minimum width of 1800 mm, either side from the point of discharge, and extended down to the eaves gutter in accordance with AS 2050.<br>(b) For a corrugated metal roof, a minimum width of 1800 mm on either side of the point of discharge shall be sealed for the full length of side laps.<br>The downpipe and gutter system of the lower catchment shall be sized in accordance with Clause 3.4 to take into account the total flow from both catchments. |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
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| | NOTE 1: The rainhead or sump may need to be larger than that sized in accordance with this Standard and include a device to dissipate energy. Sizing of such a rainhead or sump is beyond the scope of this Standard and may require hydraulic tests.<br>NOTE 2: Where spreaders are used, an allowance for an increased overflow provision for the gutter on the lower catchment should be considered.<br>NOTE 3: For a tiled roof, consideration should be given to sarking the roof below any upper eaves gutters to take into account any overflows.<br>NOTE 4: Acceptable Solution E2/AS1 allows for the use of spreaders for roof catchment areas up to 25 m² in some situations. |
| **Clause 3.7.7.1** Insert: "NOTE: Overflow outlets should be located to give an early, conspicuous warning to the building occupier that maintenance is required." | **3 Roof drainage systems — Design**<br>**3.7 Box gutter systems**<br>**3.7.7 Overflow devices**<br>**3.7.7.1 Hydraulic capacity**<br>The hydraulic capacity of an overflow device shall be not less than the design flow for the associated gutter outlet. Overflow devices shall discharge to the atmosphere.<br>NOTE: Overflow outlets should be located to give an early, conspicuous warning to the building occupier that maintenance is required. |
| **Clause 3.8** Delete and replace with:<br>"**3.8 Balcony and terrace areas**<br>Systems for draining balconies and terraces shall be designed for —<br>(a) a 10 year ARI rainfall intensity; and<br>(b) a 50 year ARI rainfall intensity for overflow." | **3 Roof drainage systems — Design**<br>**3.8 Balcony and terrace areas**<br>Systems for draining balconies and terraces shall be designed for —<br>(a) a ~~20~~ 10 year ARI rainfall intensity; and<br>(b) a ~~100~~ 50 year ARI rainfall intensity for overflow. |
| **Clause 5.4.5 (b)** Delete and replace with:<br>"(b) In New Zealand —<br>(i) the local territorial authority,<br>(ii) the National Institute for Water and Atmospheric Research (NIWA), or<br>(iii) Acceptable Solution E1/AS1 Appendix A.<br>NOTE: Rainfall intensity data is available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS). | **5 Surface water drainage systems — Design**<br>**5.4 General method**<br>**5.4.5 Rainfall intensity**<br>The rainfall intensity used in Equation 5.4.8 shall be determined for a duration equal to the time of concentration and the selected ARI, using design information available from the following:<br>(a) In Australia, from the Bureau of Meteorology's Intensity-Frequency-Duration |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also provides projections of future rainfall intensities for various climate change scenarios."<br><br>**Clause 5.4.8 (b) (ii)** Delete and replace with: "10 min duration in New Zealand." | procedure.<br>NOTE: Appendix D covers the Bureau of Meteorology's Intensity-Frequency-Duration procedure.<br>(b) In New Zealand —<br>(i) the local territorial authority,<br>(ii) the National Institute for Water and Atmospheric Research (NIWA), or<br>(iii) Acceptable Solution E1/AS1 Appendix A.<br>NOTE: Rainfall intensity data is available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS).<br>HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also provides projections of future rainfall intensities for various climate change scenarios.<br>~~(i) the network utility operator, design aids showing rainfall intensities for various durations and ARIs; or~~<br>~~(ii) Appendix F, which shows rainfall intensities for 10 min duration and ARIs of 10 and 50 years.~~<br>~~NOTE: Design aids are usually in the form of rainfall intensity/frequency duration plots and tables supplied in New Zealand by the National Institute for Water and Atmosphere (see Appendix D).~~<br><br>**5 Surface water drainage systems — Design**<br>**5.4 General method**<br>**5.4.8 Determination of design flows**<br>The general method for the determination of design flows shall be as follows:<br>(a) Select from Table 5.4.3 the AEP for the particular application.<br>(b) Determine from Clause 5.4.5 for the particular location the rainfall intensity, in mm/h, for the selected AEP and the following:<br>(i) 5 min duration in Australia.<br>(ii) 10 min duration in New Zealand.<br>~~(ii) In New Zealand, a duration of —~~<br>~~(A) 5 min, for commercial and industrial developments;~~<br>~~(B) 7 to 10 min, for residential developments; or~~ |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
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| | ~~(C) 10 min, for low density residential developments.~~ |
| **Clause 5.4.11.1 (b)** Delete and replace with: "be laid with any change of direction or cross-section occurring at either a fitting or at a stormwater pit;" | **5 Surface water drainage systems — Design**<br>**5.4 General method**<br>**5.4.11 Design of pipe drains**<br>**5.4.11.1 General**<br>Pipe drains of site stormwater drains shall —<br>(a) be laid with even gradients and straight runs and with a minimum number of changes of direction or change of cross-section;<br>(b) be laid with any change of direction or cross-section occurring at either a fitting or at a stormwater pit;<br>(c) be constructed of materials and products as specified in Clause 2.4;<br>(d) have pits and arresters, as specified in Clause 7.5;<br>(e) have surcharge outlets, as specified in Clause 5.4.12; and<br>(f) have jump-ups, as specified in Clause 7.8. |
| **Clause 6.2.8 (d)(ii)** Delete and replace with: "In New Zealand, as specified in Acceptable Solution E1/AS1." | **6 Surface and subsoil drainage systems — Installation**<br>**6.2 General requirements**<br>**6.2.8 Installation near and under buildings**<br>The following apply to a drain in close proximity to footings or foundations:<br>(….)<br>(d) Where the drain is to be laid parallel to a footing, the trench shall be located as follows:<br>(i) In Australia the drain shall be laid —<br>(A) in accordance with NCC Volume Two; and<br>(B) for single dwellings, as shown in Figure 6.2.8.<br>(ii) In New Zealand, as specified in Acceptable Solution~~s or Verification Method for the NZBC,~~ E1/AS1~~, or E1 VM1~~. |
| **Clause 6.3.1.1 (d)** Delete. | **6 Surface and subsoil drainage systems — Installation**<br>**6.3 Site stormwater drains**<br>**6.3.1 General**<br>**6.3.1.1 Site stormwater drains**<br>Site stormwater drains shall be laid —<br>(a) with no lipped joints or internal projections; |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| | (b) so as to prevent the ingress of embedment and trench fill or embankment fill; and<br>(c) with protection, to prevent damage during installation and service~~; and~~<br>~~(d) using sweep junctions~~. |
| **Clause 6.3.3 (b)** Delete and replace with: "For other properties, the minimum diameter of a stormwater drain that is downstream of a stormwater pit or inlet pit shall be the greater of —<br>(i) the diameter of the largest pipe entering the pit; or<br>(ii) DN 100." | **6 Surface and subsoil drainage systems — Installation**<br>**6.3 Site stormwater drains**<br>**6.3.3 Minimum diameter**<br>Minimum diameters shall conform with the following:<br>(a) For single dwellings in rural areas and residential buildings on urban allotments with areas less than 1000 m², minimum diameters shall be DN 90.<br>(b) For other properties ~~that are,~~ the minimum diameter of a stormwater drain that is downstream of a stormwater pit or inlet pit shall be the greater of —<br>(i) the diameter of the largest pipe entering the pit; or<br>(ii) DN 100 ~~150~~.<br>~~An exception to the above is at footpath crossings [see Clause 7.5.1.2(b)] where multiple pipes of DN 100 or less are used.~~ |
| **Clause 6.4 Subsoil drains** Insert "Informative only." | **6 Surface and subsoil drainage systems — Installation**<br>**6.4 Subsoil drains**<br>Informative only. |
| **Clause 7.4.1 NOTE** Delete and replace with: "NOTE: Inspection openings may be replaced by a stormwater pit." | **7 Surface water and subsoil drainage systems — Ancillaries**<br>**7.4 Inspection openings**<br>**7.4.1 Location**<br>For other than single dwellings, inspection openings for the maintenance of site stormwater drains shall be extended to and capped at the finished surface level and installed at —<br>(a) each point of connection;<br>(b) even spacings not more than 30 m apart;<br>(c) each end of any inclined jump-up that exceeds 6 m in length;<br>(d) each connection to an existing site stormwater drain; and |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| | (e) at any change of direction greater than 45°.<br>NOTE: Inspection openings may be replaced by a~~n inlet or~~ stormwater pit. |
| **Clause 7.5.1.1 (b)** Delete. | **7 Surface water and subsoil drainage systems — Ancillaries**<br>**7.5 Stormwater pits, inlet pits and arresters**<br>**7.5.1 Purpose**<br>**7.5.1.1 Stormwater pits**<br>Stormwater pits shall be installed —<br>(a) to provide access to and maintenance of —<br>(i) junctions, changes of gradient and changes of direction of site stormwater drains;<br>(ii) inspection openings within buildings;<br>(iii) reflux valves; or<br>(iv) flap valves fitted at the downstream ends of subsoil drains~~; and~~<br>~~(b) where used, to operate as an inlet pit~~. |
| **Clause 7.5.1.2** Delete and replace with: "Inlet pits shall be installed —<br>(a) to allow the collection and ingress of stormwater to a site stormwater drain,<br>(b) with sufficient capacity for settlement of silt and debris, and<br>(c) with a submerged (or trapped) outlet which prevents floatable solids entering the site stormwater drain, and<br>(d) where necessary, to operate as a surcharge outlet (see Clause 5.4.12).<br>NOTE: Inlet pits should not receive discharge from stormwater drains." | **7 Surface water and subsoil drainage systems — Ancillaries**<br>**7.5 Stormwater pits, inlet pits and arresters**<br>**7.5.1 Purpose**<br>**7.5.1.2 Inlet pits**<br>Inlet pits shall be installed —<br>(a) to allow the collection and ingress of stormwater to a site stormwater drain,<br>(b) with sufficient capacity for settlement of silt and debris, and<br>(c) with a submerged (or trapped) outlet which prevents floatable solids entering the site stormwater drain, and<br>~~(b)~~ (d) where necessary, to operate as a surcharge outlet (see Clause 5.4.12).<br>~~(c) when the point of connection is a street kerb and gutter and the diameter of the site stormwater drain is larger than DN 100.~~<br>NOTE: Inlet pits should not receive discharge from stormwater drains. ~~A sump and screen similar to that shown in Figure 7.5.1.2 should be provided adjacent to the property boundary to provide transition to smaller pipes or conduits passing under the footpath.~~ |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| **Appendix D - D.2.2 New Zealand** Delete and replace with: "The procedure for the determination of rainfall intensities, in mm/h, for the site considered is as follows:<br>(a) Use the figures if the location is given in NZBC Acceptable Solution E1/AS1 Appendix A.<br>(b) If the location is not given in Acceptable Solution E1/AS1 Appendix A —<br>(i) determine the location of the site;<br>(ii) go to the National Institute for Water and Atmospheric Research (NIWA) website and access the High Intensity Rainfall Design System (HIRDS) that provides design rainfall data;<br>(iii) enter the site address or latitude and longitude and obtain a Intensity-Duration-Frequency output table. Determine the rainfall intensity (mm/hr) for the relevant ARI (Average Recurrence Interval) or AEP (annual exceedance probability), and for a duration of 10 min from the table." | **Appendix D Guidelines for determining rainfall intensities (Informative)**<br>**D.2.2 New Zealand**<br>The procedure for the determination of rainfall intensities, in mm/h, for the site considered is as follows:<br>(a) Use the figures if the location is given in NZBC Acceptable Solution E1/AS1 Appendix A.<br>(b) If the location is not given in Acceptable Solution E1/AS1 Appendix A —<br>(i) determine the location of the site;<br>(ii) go to the National Institute for Water and Atmospheric Research (NIWA) website and access the High Intensity Rainfall Design System (HIRDS) that provides design rainfall data;<br>(iii) enter the site address or latitude and longitude and obtain a Intensity-Duration-Frequency output table. Determine the rainfall intensity (mm/hr) for the relevant ARI (Average Recurrence Interval) or AEP (annual exceedance probability), and for a duration of 10 min from the table."<br>~~(a) If shown in Figures F.1 to F.4, Appendix F, read directly from the relevant figure (see Paragraph F2, Appendix F).~~<br>~~(b) If not shown in Figures F.1 to F.4, Appendix F, determine the latitude and longitude from a map and either —~~<br>~~(i) plot its position on and read directly from the relevant figure; or~~<br>~~(ii) submit the latitude and longitude with a request for the required rainfall intensity to the National Institute for Water and Atmospheric Research (NIWA).~~ |
| **Appendix F** Delete. | ~~**Appendix F (normative)**~~<br>~~**Rainfall intensities for New Zealand — 10 min duration**~~<br>~~**F.1 Scope**~~<br>~~This Appendix gives 10-min duration rainfall intensities for any place in New Zealand, based on the National Institute of Water and Atmosphere (NIWA) data, used for the sizing of —~~ |

| Proposed text for new E1/AS2 | Excerpts from AS/NZS 3500.3:2018 indicating proposed E1/AS2 modifications |
|---|---|
| | ~~(a) rainwater goods (see Clause 3.3.5.2); and~~<br>~~(b) surface water drainage systems [see Clause 5.4.5(b)].~~<br>~~**F.2 10 Minutes duration rainfall intensities**~~<br>~~Rainfall intensities of 10 min duration for ARIs of 10 and 50 years for any place in New Zealand may be determined from the following figures:~~<br>~~(a) Figures F.1 and F.3 — Rainfall intensities for an ARI of 10 years.~~<br>~~(b) Figures F.2 and F.4 — Rainfall intensities for an ARI of 50 years.~~<br>~~The figures are marked with isopleths of rainfall intensity (lines of equal rainfall intensity).~~ |
| **Appendix K** Insert "NOTE: The design solution examples for surface water drainage systems shown in Appendix K do not address the modifications made to AS/NZS 3500.3 by Acceptable Solution E1/AS2 and do not reflect requirements in New Zealand." | ~~**Appendix K Surface water drainage systems — Nominal and general methods — Examples (Informative)**~~<br><br>~~NOTE: The design solution examples for surface water drainage systems shown in Appendix K do not address the modifications made to AS/NZS 3500.3 by E1/AS2 and do not reflect requirements in New Zealand.~~ |

## Item 2 – Rainfall intensities: Amend E1/AS1 Appendix A to replace the rainfall intensity maps with a table that provides location specific rainfall intensity data

The existing rainfall intensity maps in E1/AS1 Appendix A are proposed to be replaced with a table listing specific design rainfall intensities for approximately 250 NZ towns and cities.

The rainfall intensities in the proposed new rainfall intensity table have been produced by the National Institute for Water and Atmospheric Research's (NIWA) and are based on historical rainfall data derived from HIRDSv4 (http://hirds.niwa.co.nz).

This new rainfall intensity table is intended to:

- Ensure that the rainfall intensity data within E1/AS1 Appendix A is current and up to date
- Ensure that surface water drainage systems designed using the rainfall intensity data within E1/AS1 Appendix A are appropriately sized to meet the performance criteria of NZBC clause E1 *Surface Water*
- Reduce the risk of user error when selecting an appropriate design rainfall intensity - it is easier to select from a table as opposed to interpolating from a contoured map.

Further amendments are proposed in the document to support the inclusion of the new tables.

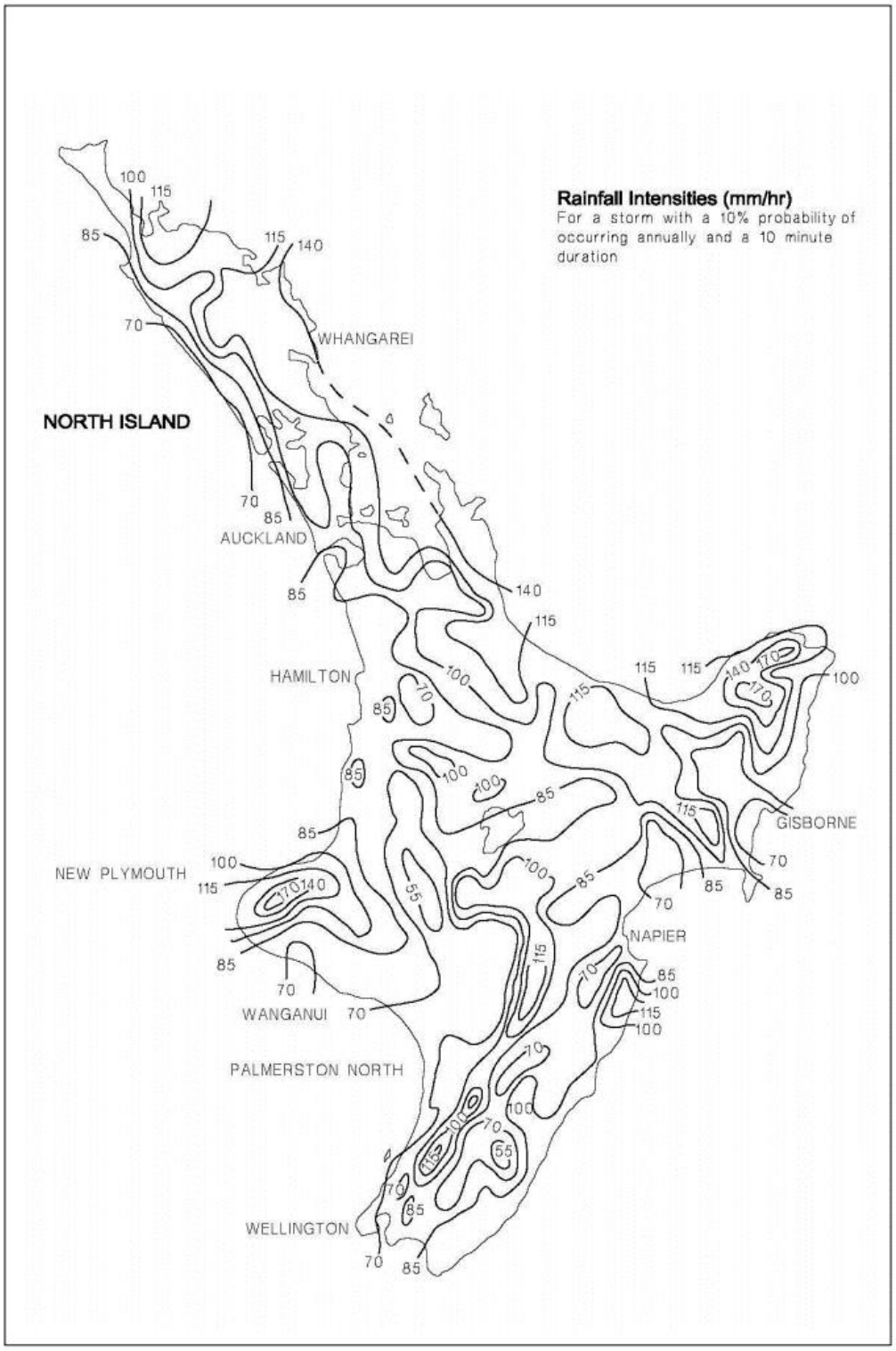
An informative comment is proposed within Verification Method E1/VM1 to provide additional information about the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS). The proposed text notes that HIRDS can be used to provide rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also projections of future rainfall intensities for various climate change scenarios.

The benefit of adding this comment is that it provides information on the availability of predictive rainfall intensity data for those who wish to account for the projected effects of climate change when using E1/VM1.

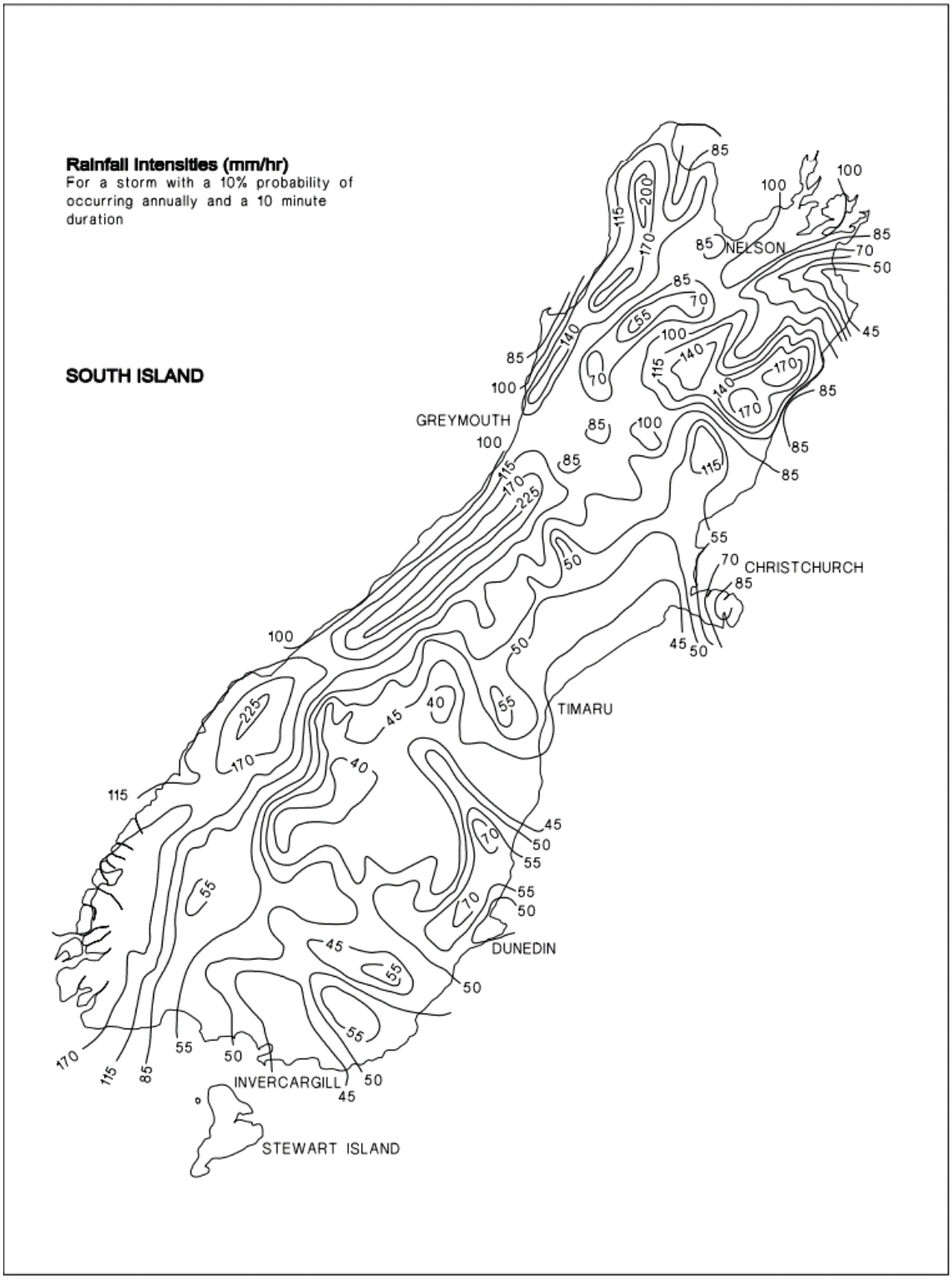
| Current Text | Proposed text |
|---|---|
| **E1 Definitions** | |
| | **Annual Exceedance Probability (AEP)**<br>The probability that a given rainfall intensity will be exceeded in any one year, expressed as a percentage. |
| **E1/AS1** | |
| **3.2.2** Figure 3 provides a method for selecting the correct pipe size for a calculated modified catchment area, given as:<br>Modified catchment area = 0.01 AI, where<br>A = area being drained comprising plan roof area (m²) plus paved area (m²). Paved area includes paving blocks, concrete, asphalt or metalled surfaces. | **3.2.2** Figure 3 provides a method for selecting the correct pipe size for a calculated modified catchment area, given as:<br>Modified catchment area = 0.01 AI, where<br>A = area being drained comprising plan roof area (m²) plus paved area (m²). Paved area includes paving blocks, concrete, asphalt or metalled surfaces. |

| Current Text | Proposed text |
|---|---|
| I = rainfall intensity for a storm with a 10% probability of occurring annually and a 10 minute duration (mm/hr).<br>The rainfall intensity (I) shall be obtained from the territorial authority. Where the territorial authority does not have this information the rainfall intensity shall be determined by interpolation of the figures in Appendix A | I = rainfall intensity for a storm with a 10% probability of occurring annually and a 10 minute duration (mm/hr).<br>The rainfall intensity (I) shall be obtained from the territorial authority. Where the territorial authority does not have this information the rainfall intensity shall be determined from the table in Appendix A |
| **Appendix A Rainfall Intensities**<br>[Refer to existing maps to be removed on the following pages] | **Appendix A Rainfall Intensities**<br>[Refer to new tables to be added on the following pages] |
| **E1/VM1** | |
| **2.0 Rainfall intensity**<br><br>**2.2.1** The rainfall intensity shall be that for a storm having a duration equal to the time of concentration as determined by Paragraph 2.3.1, and a probability of occurrence as given by NZBC E1.3.1 or E1.3.2 as appropriate. Either local rainfall intensity curves produced by the territorial authority or rainfall frequency duration information produced by NIWA shall be used to determine the rainfall intensity. | **2.0 Rainfall intensity**<br><br>**2.2.1** The rainfall intensity shall be that for a storm having a duration equal to the time of concentration as determined by Paragraph 2.3.1, and a probability of occurrence as given by NZBC E1.3.1 or E1.3.2 as appropriate. Either local rainfall intensity curves produced by the territorial authority or rainfall frequency duration information produced by NIWA shall be used to determine the rainfall intensity. |
| **COMMENT:**<br>Rainfall intensity curves are available for most areas. These have been developed from meteorological data. Rainfall frequency-duration tables for each official rain gauge throughout New Zealand are also available.<br><br>Rainfall frequency duration data is also available from NIWA, in digital form, as HIRDS (High Intensity Rainfall Design System). | **COMMENT:**<br>Rainfall intensity curves are available for most areas. These have been developed from meteorological data. Rainfall frequency-duration tables for each official rain gauge throughout New Zealand are also available.<br>Rainfall intensity data is also available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS).<br><br>HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and also projections of future rainfall intensities for various climate change scenarios. |

## Current E1/AS1 Appendix A Rainfall Intensities [To be removed]



## Current E1/AS1 Appendix A Rainfall Intensities [To be removed] - Continued



## Proposed E1/AS1 Appendix A Rainfall Intensities

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| **NORTHLAND** | | | | |
| Taipa Bay-Mangonui | -35 | 173.5 | 86 | 117 |
| Awanui | -35.05 | 173.25 | 85 | 116 |
| Kaeo | -35.1 | 173.78 | 91 | 123 |
| Kaitaia | -35.11 | 173.26 | 86 | 117 |
| Ahipara | -35.17 | 173.17 | 86 | 116 |
| Kerikeri | -35.23 | 173.95 | 101 | 135 |
| Russell | -35.27 | 174.12 | 109 | 147 |
| Paihia | -35.29 | 174.09 | 110 | 148 |
| Okaihau | -35.32 | 173.77 | 97 | 130 |
| Ohaeawai | -35.35 | 173.88 | 99 | 132 |
| Moerewa | -35.38 | 174.02 | 108 | 144 |
| Kawakawa | -35.38 | 174.07 | 110 | 147 |
| Rawene | -35.4 | 173.5 | 85 | 114 |
| Kaikohe | -35.41 | 173.81 | 94 | 125 |
| Omapere and Opononi | -35.51 | 173.4 | 85 | 114 |
| Whangarei | -35.72 | 174.3 | 103 | 140 |
| Maungatapere | -35.75 | 174.2 | 101 | 137 |
| Dargaville | -35.95 | 173.87 | 82 | 110 |
| Te Kopuru | -36.03 | 173.92 | 83 | 112 |
| Mangawhai Heads | -36.05 | 174.59 | 94 | 130 |
| Kaiwaka | -36.1 | 174.39 | 90 | 123 |
| Maungaturoto | -36.12 | 174.35 | 89 | 121 |
| Ruawai | -36.13 | 174.03 | 83 | 112 |
| **AUCKLAND** | | | | |
| Leigh | -36.19 | 174.63 | 95 | 130 |
| Snells Beach | -36.21 | 174.69 | 93 | 127 |
| Algies Bay-Mahurangi | -36.26 | 174.76 | 92 | 124 |
| Wellsford | -36.3 | 174.52 | 100 | 135 |
| Parakai | -36.38 | 174.45 | 95 | 128 |
| Warkworth | -36.4 | 174.66 | 99 | 134 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Muriwai Beach | -36.52 | 174.69 | 98 | 129 |
| Helensville | -36.68 | 174.45 | 95 | 125 |
| North Shore | -36.81 | 174.79 | 98 | 129 |
| Waiheke Island | -36.81 | 175.12 | 102 | 137 |
| Auckland | -36.87 | 174.77 | 97 | 127 |
| Waitakere | -36.91 | 174.69 | 97 | 128 |
| Manukau | -36.97 | 174.82 | 93 | 121 |
| Bombay | -37.05 | 174.95 | 97 | 129 |
| Pukekohe | -37.2 | 174.9 | 97 | 131 |
| Waiuku | -37.25 | 174.73 | 92 | 122 |
| **WAIKATO** | | | | |
| Coromandel | -36.74 | 175.5 | 96 | 132 |
| Tairua | -37.02 | 175.86 | 97 | 137 |
| Te Puru-Thornton Bay | -37.04 | 175.52 | 91 | 127 |
| Thames | -37.14 | 175.53 | 88 | 124 |
| Whangamata | -37.21 | 175.86 | 97 | 137 |
| Ngatea | -37.27 | 175.5 | 88 | 123 |
| Kerepehi | -37.3 | 175.53 | 87 | 121 |
| Meremere | -37.32 | 175.07 | 96 | 132 |
| Paeroa | -37.38 | 175.67 | 88 | 125 |
| Te Kauwhata | -37.4 | 175.15 | 92 | 127 |
| Waihi | -37.4 | 175.83 | 107 | 152 |
| Te Aroha | -37.53 | 175.7 | 94 | 135 |
| Huntly | -37.56 | 175.16 | 91 | 125 |
| Waitoa | -37.6 | 175.63 | 90 | 129 |
| Morrinsville | -37.65 | 175.53 | 91 | 130 |
| Waharoa | -37.75 | 175.75 | 89 | 129 |
| Hamilton | -37.78 | 175.27 | 92 | 129 |
| Raglan | -37.8 | 174.86 | 89 | 121 |
| Matamata | -37.82 | 175.77 | 89 | 129 |
| Cambridge | -37.89 | 175.45 | 91 | 129 |
| Te Awamutu | -38.02 | 175.32 | 92 | 129 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Putaruru | -38.05 | 175.78 | 85 | 121 |
| Mamaku | -38.06 | 176.05 | 102 | 143 |
| Otorohanga | -38.18 | 175.19 | 94 | 132 |
| Tokoroa | -38.23 | 175.84 | 85 | 121 |
| Te Kuiti | -38.33 | 175.17 | 96 | 136 |
| Mangakino | -38.38 | 175.74 | 75 | 107 |
| Piopio | -38.47 | 175.02 | 95 | 134 |
| Reporoa | -38.5 | 176.36 | 84 | 121 |
| Taupo | -38.7 | 176.07 | 73 | 107 |
| Turangi | -38.99 | 175.79 | 71 | 103 |
| **BAY OF PLENTY** | | | | |
| Waihi Beach | -37.4 | 175.93 | 99 | 141 |
| Island View - Pios Beach | -37.46 | 175.99 | 95 | 136 |
| Katikati | -37.56 | 175.9 | 93 | 133 |
| Tauranga | -37.68 | 176.17 | 101 | 145 |
| Maketu | -37.77 | 176.45 | 109 | 156 |
| Te Puke | -37.78 | 176.33 | 103 | 148 |
| Paengaroa | -37.82 | 176.42 | 106 | 152 |
| Te Kaha | -37.82 | 177.67 | 96 | 136 |
| Matata | -37.89 | 176.75 | 116 | 163 |
| Edgecumbe | -37.97 | 176.83 | 112 | 160 |
| Whakatane | -37.97 | 176.99 | 100 | 142 |
| Opotiki | -38.01 | 177.28 | 102 | 146 |
| Te Teko | -38.03 | 176.8 | 98 | 139 |
| Taneatua | -38.07 | 176.98 | 95 | 135 |
| Kawerau | -38.1 | 176.7 | 95 | 136 |
| Rotorua | -38.14 | 176.26 | 96 | 136 |
| Kaingaroa Forest | -38.36 | 176.68 | 91 | 128 |
| Murupara | -38.45 | 176.7 | 84 | 119 |
| **GISBORNE** | | | | |
| Ruatoria | -37.9 | 178.32 | 80 | 119 |
| Tokomaru Bay | -38.12 | 178.3 | 68 | 103 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Patutahi | -38.38 | 177.53 | 59 | 83 |
| Tolaga Bay | -38.37 | 178.3 | 61 | 93 |
| Manutuke | -38.41 | 177.55 | 52 | 74 |
| Te Karaka | -38.47 | 177.87 | 47 | 73 |
| Gisborne | -38.66 | 178.02 | 67 | 102 |
| **MANAWATU-WHANGANUI** | | | | |
| Ohura | -38.85 | 174.98 | 86 | 124 |
| Taumarunui | -38.88 | 175.26 | 84 | 123 |
| Ohakune | -39.41 | 175.41 | 77 | 111 |
| Raetihi | -39.42 | 175.27 | 90 | 130 |
| Waiouru | -39.47 | 175.67 | 62 | 91 |
| Taihape | -39.68 | 175.78 | 65 | 97 |
| Wanganui | -39.93 | 175.03 | 68 | 100 |
| Hunterville | -39.93 | 175.57 | 70 | 103 |
| Ratana | -40.03 | 175.17 | 66 | 96 |
| Marton | -40.08 | 175.38 | 69 | 101 |
| Halcombe | -40.13 | 175.48 | 73 | 107 |
| Bulls | -40.17 | 175.38 | 71 | 102 |
| Sanson | -40.22 | 175.42 | 70 | 102 |
| Feilding | -40.22 | 175.57 | 69 | 101 |
| Dannevirke | -40.21 | 176.09 | 77 | 119 |
| Rongotea | -40.3 | 175.42 | 67 | 97 |
| Himatangi Beach | -40.32 | 175.24 | 66 | 93 |
| Woodville | -40.33 | 175.87 | 66 | 99 |
| Palmerston North | -40.36 | 175.62 | 65 | 94 |
| Pahiatua | -40.45 | 175.83 | 61 | 91 |
| Foxton | -40.47 | 175.28 | 71 | 100 |
| Tokomaru | -40.47 | 175.5 | 68 | 98 |
| Shannon | -40.55 | 175.4 | 70 | 100 |
| Levin | -40.61 | 175.27 | 74 | 104 |
| Te Horo | -40.63 | 175.19 | 76 | 107 |
| Eketahuna | -40.65 | 175.7 | 73 | 105 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| **HAWKES BAY** | | | | |
| Tuai | -38.82 | 177.15 | 69 | 98 |
| Frasertown | -38.97 | 177.4 | 70 | 103 |
| Wairoa | -39.04 | 177.42 | 82 | 121 |
| Nuhaka | -39.03 | 177.75 | 84 | 126 |
| Napier | -39.5 | 176.89 | 69 | 105 |
| Hastings | -39.64 | 176.83 | 62 | 95 |
| Otane | -39.9 | 176.62 | 69 | 106 |
| Waipawa | -39.95 | 176.57 | 67 | 104 |
| Waipukurau | -40 | 176.56 | 65 | 100 |
| Takapau | -40.03 | 176.35 | 72 | 113 |
| **TARANAKI** | | | | |
| Waitara | -39 | 174.23 | 98 | 136 |
| Urenui | -39 | 174.38 | 95 | 133 |
| New Plymouth | -39.05 | 174.07 | 100 | 138 |
| Egmont Village | -39.14 | 174.12 | 114 | 158 |
| Inglewood | -39.15 | 174.2 | 117 | 163 |
| Okato | -39.2 | 173.88 | 111 | 153 |
| Rahotu | -39.28 | 173.78 | 99 | 137 |
| Stratford | -39.35 | 174.27 | 99 | 138 |
| Kaponga | -39.43 | 174.15 | 94 | 132 |
| Eltham | -39.43 | 174.3 | 97 | 137 |
| Opunake | -39.46 | 173.84 | 87 | 121 |
| Manaia | -39.55 | 174.12 | 83 | 117 |
| Hawera | -39.59 | 174.28 | 84 | 119 |
| Patea | -39.75 | 174.47 | 79 | 112 |
| Waverley | -39.77 | 174.63 | 80 | 115 |
| **TASMAN** | | | | |
| Takaka | -40.85 | 172.8 | 78 | 108 |
| Riwaka | -41.05 | 173 | 77 | 108 |
| Motueka | -41.11 | 173.02 | 68 | 94 |
| Brightwater | -41.38 | 173.1 | 80 | 115 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Wakefield | -41.4 | 173.05 | 81 | 117 |
| Murchison | -41.8 | 172.33 | 56 | 85 |
| **WELLINGTON** | | | | |
| Otaki | -40.75 | 175.13 | 82 | 114 |
| Kapiti | -40.94 | 174.99 | 75 | 103 |
| Masterton | -40.95 | 175.67 | 54 | 80 |
| Carterton | -41.02 | 175.52 | 57 | 83 |
| Greytown | -41.08 | 175.45 | 57 | 82 |
| Upper Hutt | -41.12 | 175.07 | 72 | 99 |
| Featherston | -41.12 | 175.32 | 63 | 88 |
| Porirua | -41.13 | 174.83 | 76 | 105 |
| Makara-Ohariu | -41.2 | 174.75 | 74 | 102 |
| Lower Hutt | -41.21 | 174.91 | 72 | 100 |
| Martinborough | -41.22 | 175.44 | 54 | 77 |
| Wellington | -41.28 | 174.77 | 70 | 97 |
| **WEST COAST** | | | | |
| Hector-Ngakawau | -41.63 | 171.87 | 84 | 122 |
| Westport | -41.75 | 171.58 | 101 | 145 |
| Reefton | -42.11 | 171.87 | 71 | 103 |
| Blackball | -42.3 | 171.49 | 92 | 132 |
| Dobson | -42.39 | 171.44 | 93 | 133 |
| Greymouth | -42.45 | 171.21 | 95 | 133 |
| Hokitika | -42.72 | 170.97 | 104 | 144 |
| Ross | -42.9 | 170.82 | 110 | 149 |
| Franz Josef | -43.38 | 170.17 | 92 | 124 |
| Fox Glacier | -43.42 | 170.05 | 99 | 133 |
| **NELSON** | | | | |
| Nelson | -41.27 | 173.3 | 77 | 107 |
| **MARLBOROUGH** | | | | |
| Havelock | -41.28 | 173.77 | 70 | 98 |
| Picton | -41.3 | 174.01 | 59 | 83 |
| Blenheim | -41.52 | 173.95 | 48 | 69 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Seddon | -41.67 | 174.07 | 49 | 70 |
| **CANTERBURY** | | | | |
| Kaikoura | -42.4 | 173.69 | 53 | 79 |
| Hanmer Springs | -42.52 | 172.83 | 46 | 72 |
| Culverden | -42.77 | 172.85 | 43 | 67 |
| Cheviot | -42.81 | 173.26 | 45 | 70 |
| Amberley | -43.15 | 172.72 | 42 | 65 |
| Rangiora | -43.3 | 172.6 | 46 | 71 |
| Oxford | -43.3 | 172.18 | 60 | 93 |
| Woodend | -43.32 | 172.67 | 42 | 65 |
| Cust | -43.32 | 172.37 | 53 | 84 |
| Darfield | -43.48 | 172.12 | 47 | 75 |
| Christchurch | -43.53 | 172.62 | 39 | 62 |
| Rolleston | -43.58 | 172.38 | 48 | 77 |
| Burnham Military Camp | -43.61 | 172.32 | 47 | 75 |
| Lincoln | -43.63 | 172.48 | 51 | 82 |
| Methven | -43.63 | 171.63 | 54 | 83 |
| Dunsandel | -43.67 | 172.2 | 46 | 74 |
| Taitapu | -43.68 | 172.54 | 41 | 65 |
| Mt Cook | -43.66 | 170.17 | 72 | 102 |
| Rakaia | -43.75 | 172.02 | 48 | 76 |
| Leeston | -43.77 | 172.3 | 47 | 75 |
| Akaroa | -43.81 | 172.97 | 37 | 57 |
| Southbridge | -43.82 | 172.25 | 46 | 72 |
| Ashburton | -43.88 | 171.76 | 52 | 80 |
| Lake Tekapo | -44 | 170.5 | 33 | 53 |
| Geraldine | -44.1 | 171.23 | 48 | 75 |
| Fairlie | -44.1 | 170.83 | 55 | 86 |
| Temuka | -44.23 | 171.27 | 44 | 71 |
| Pleasant Point | -44.27 | 171.13 | 47 | 75 |
| Twizel | -44.25 | 170.1 | 37 | 58 |
| Timaru | -44.4 | 171.26 | 46 | 73 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| Pareora | -44.47 | 171.22 | 48 | 77 |
| Omarama | -44.48 | 169.97 | 35 | 57 |
| Otematata | -44.6 | 170.18 | 38 | 61 |
| Waimate | -44.74 | 171.06 | 42 | 65 |
| Kurow | -44.73 | 170.47 | 42 | 65 |
| **OTAGO** | | | | |
| Wanaka | -44.7 | 169.13 | 26 | 40 |
| Arrowtown | -44.93 | 168.83 | 32 | 50 |
| Oamaru | -45.09 | 170.98 | 42 | 65 |
| Cromwell | -45.05 | 169.2 | 36 | 59 |
| Queenstown | -45.04 | 168.65 | 34 | 53 |
| Ranfurly | -45.12 | 170.1 | 52 | 85 |
| Kakanui | -45.18 | 170.9 | 42 | 65 |
| Clyde | -45.18 | 169.32 | 45 | 75 |
| Alexandra | -45.25 | 169.38 | 44 | 73 |
| Hampden | -45.33 | 170.82 | 43 | 67 |
| Palmerston | -45.48 | 170.72 | 45 | 71 |
| Roxburgh | -45.53 | 169.32 | 53 | 90 |
| Waikouaiti | -45.6 | 170.68 | 44 | 69 |
| Karitane | -45.63 | 170.65 | 44 | 70 |
| Warrington | -45.72 | 170.59 | 43 | 68 |
| Waitati | -45.75 | 170.57 | 43 | 69 |
| Outram | -45.87 | 170.23 | 51 | 81 |
| Dunedin | -45.89 | 170.5 | 47 | 73 |
| Lawrence | -45.92 | 169.68 | 54 | 87 |
| Tapanui | -45.95 | 169.27 | 54 | 90 |
| Milton | -46.12 | 169.97 | 56 | 88 |
| Clinton | -46.2 | 169.38 | 53 | 86 |
| Balclutha | -46.23 | 169.73 | 55 | 87 |
| Stirling | -46.25 | 169.78 | 54 | 85 |
| Kaitangata | -46.28 | 169.85 | 54 | 85 |
| Owaka | -46.45 | 169.65 | 49 | 77 |

| 10 minute duration rainfall intensities for various locations in New Zealand | | | | |
|---|---|---|---|---|
| **Location** | **Latitude degrees** | **Longitude degrees** | **10% AEP intensity mm/h** | **2% AEP intensity mm/h** |
| **SOUTHLAND** | | | | |
| Te Anau | -45.42 | 167.72 | 48 | 75 |
| Manapouri | -45.57 | 167.62 | 51 | 78 |
| Lumsden | -45.73 | 168.43 | 52 | 87 |
| Riversdale | -45.9 | 168.73 | 50 | 84 |
| Ohai | -45.93 | 167.95 | 50 | 80 |
| Gore | -46.1 | 168.93 | 57 | 95 |
| Winton | -46.15 | 168.32 | 47 | 76 |
| Tuatapere | -46.13 | 167.68 | 45 | 71 |
| Otautau | -46.15 | 168 | 46 | 74 |
| Edendale | -46.32 | 168.78 | 48 | 80 |
| Wyndham | -46.33 | 168.85 | 49 | 82 |
| Riverton | -46.36 | 168 | 49 | 77 |
| Invercargill | -46.41 | 168.32 | 54 | 87 |
| Bluff | -46.49 | 168.29 | 51 | 81 |

**COMMENTS**

Rainfall intensity data is also available online in digital form from the National Institute for Water and Atmospheric Research (NIWA) High Intensity Rainfall Design System (HIRDS).

HIRDS provides rainfall intensity estimates for any location in New Zealand based on historical rain gauge data and projections of future rainfall intensities for various climate change scenarios.

## Item 3 – Referenced standards: Amend E1/VM1 and E1/AS1 to update references to product manufacturing and installation Standards

MBIE propose to update a number of E1/VM1 and E1/AS1 referenced Standards to align with those currently used for the manufacturing and installation of surface water drainage system components.

| Current Text | Proposed text |
|---|---|
| **E1 References** | |
| AS/NZS 1260: 2009 PVC-U Pipes and fittings for drain, waste and vent application<br>*Amend: 1, 2*<br>Where quoted: AS1 Table 4 | AS/NZS 1260: 2017 PVC-U pipes and fittings for drain, waste and vent applications<br><br>Where quoted: AS1 Table 1, Table 4 |
| AS/NZS 2280: 2014 Ductile iron pipes and fittings<br>*Amend: 1* | AS/NZS 2280: 2014 Ductile iron pipes and fittings<br>*Amend: 1, 2* |
| AS/NZS 2566:- Buried Flexible pipelines<br>Part 1: 1998 Structural Design<br>Part 2: 2002 Installation<br>Amend: 1 | AS/NZS 2566 Buried Flexible pipelines.<br>Part 1: 1998 Structural Design<br>Part 2: 2002 Installation<br>*Amend: 1, 2, 3* |
| AS/NZS 4130:2009 Polyethylene (PE) pipes for pressure applications<br>*Amend: 1* | AS/NZS 4130:2018 Polyethylene (PE) pipes for pressure applications |
| AS/NZS 5065: 2005 Polyethylene and polypropylene pipe and fittings for drainage and sewerage applications<br>*Amend: 1* | AS/NZS 5065: 2005 Polyethylene and polypropylene pipe and fittings for drainage and sewerage applications<br>*Amend: 1, 2* |
| AS 1397: 2001 Steel sheet and strip – Hot-dipped zinc-coated or aluminium/zinc-coated | AS 1397: 2011 Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium *Amend: 1* |
| AS 3706:- Geotextiles – Methods of test<br>Part 1: 2003 General requirements, sampling, conditioning, basic<br>physical properties and statistical analysis | AS 3706:- Geotextiles – Methods of test<br>Part 1: 2012 General requirements, sampling, conditioning, basic<br>physical properties and statistical analysis |

## Item 4 – Editorial: Correct a spelling mistake in E1/AS1

MBIE propose to correct a spelling mistake in E1/AS1.

| Current Text | Proposed text |
|---|---|
| **E1/AS1** | |
| **3.6.2** Two different sumps are shown in Figures 8 and 9. The sump shown in Figure 8 is suitable for an area of up to 4500/I m2 and the sump illustrated by Figure 9 is suitable for an area up to 40,000/I m2, where I is the rainfall intensity for a storm with a 10% probability of occuring annually. (See Paragraph 3.2.2.) | **3.6.2** Two different sumps are shown in Figures 8 and 9. The sump shown in Figure 8 is suitable for an area of up to 4500/I m2 and the sump illustrated by Figure 9 is suitable for an area up to 40,000/I m2, where I is the rainfall intensity for a storm with a 10% probability of occurring annually. (See Paragraph 3.2.2.) |

# E2 External Moisture

**MBIE proposes to amend Acceptable Solution E2/AS1 to reflect changes being proposed to NZBC clause E1 Surface water and the introduction of Acceptable Solution E1/AS2.**

**1. Align E2/AS1 with new E1 Acceptable Solution E1/AS2 for the design of gutters, downpipes and spreaders**

## Item 1 – Align E2/AS1 with new E1 Acceptable Solution E1/AS2 for the design of gutters, downpipes and spreaders

Minor amendments to E2/AS1 are proposed to support the introduction of Acceptable Solution E1/AS2 as an additional means of demonstrating compliance with E1 Surface water.

Within E2/AS1, the proposal is to replace current references to E1/AS1 with a more general requirement to ensure gutter and channel capacities meet the requirements of NZBC clause E1 Surface Water. This will allow the use of the proposed new Acceptable Solution E1/AS2 as an alternative to E1/AS1 for demonstrating the capacity of gutters and channels.

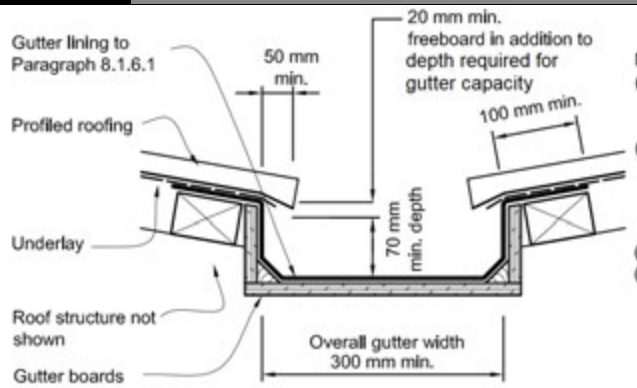
| Current text | Proposed text |
|---|---|
| **E2/AS1 7.0 Decks and Pergolas** | |
| **7.3.2.1 Concrete slab**<br>Where provision for level access is required from a concrete floor slab to exterior paving, this shall be as shown in Figure 17B with:<br>a) A channel, together with drainage provisions, across the door opening, with:<br>i) the width to suit capacity in accordance with E1/AS1,<br>ii) a minimum depth of 150 mm,<br>iii) a maximum length of 3700 mm, and<br>iv) 1:200 minimum fall along length of channel towards a drainage outlet,<br>b) Grating, in accordance with Tables 21 and 22, over the channel, that:<br>i) is supported independently of the door frame,<br>ii) is removable to allow access for cleaning,<br>iii) is specifically designed to accommodate imposed loads,<br>iv) has gaps sized to prevent the wheels of wheel chairs or mobility aids entering or being trapped, and | **7.3.2.1 Concrete slab**<br>Where provision for level access is required from a concrete floor slab to exterior paving, this shall be as shown in Figure 17B with:<br>a) A channel, together with drainage provisions, across the door opening, with:<br>i) width and depth dimensions to provide capacity that meets the requirements of NZBC Clause E1,<br>ii) a minimum width of 200 mm and minimum depth of 150 mm,<br>iii) a maximum length of 3700 mm, and<br>iv) 1:200 minimum fall along length of channel towards a drainage outlet,<br>b) Grating, in accordance with Tables 21 and 22, over the channel, that:<br>i) is supported independently of the door frame,<br>ii) is removable to allow access for cleaning,<br>iii) is specifically designed to accommodate imposed loads,<br>iv) has gaps sized to prevent the wheels of wheel chairs or mobility aids entering or being trapped, and |

| Current text | Proposed text |
|---|---|
| v) has a continuous gap of 12 mm minimum from door frame and wall cladding, and<br><br>**COMMENT:**<br>The grating support must be specifically detailed to suit the condition of the building and site.<br><br>c) Exterior paving that:<br>i) has a minimum fall of 1:40 away from the channel for a minimum distance of 1 m,<br>together with the surrounding paving and ground levels, complies with drainage requirements of E1/AS1. | v) has a continuous gap of 12 mm minimum from door frame and wall cladding, and<br><br>**COMMENT:**<br>The grating support must be specifically detailed to suit the condition of the building and site.<br><br>c) Exterior paving that:<br>i) has a minimum fall of 1:40 away from the channel for a minimum distance of 1 m,<br>together with the surrounding paving and ground levels, meets the drainage requirements of NZBC clause E1. |
| **E2/AS1 8.0 Roof Claddings** | |
| **8.1.6 Gutters general**<br>Gutters, downpipes and spreaders, including *eaves* gutters/spoutings are required for the drainage of *roof* water, and shall:<br>a) Be to the minimum dimensions shown in this Acceptable Solution, or calculated to E1/AS1, whichever is the greater<br><br>…<br>**8.1.6.1 Internal gutters**<br>Internal gutters shall:<br>…<br>d) Be constructed to at least the minimum dimensions shown in Figure 52, or the capacity calculated to E1/AS1 plus an additional freeboard depth of 20 mm minimum. | **8.1.6 Gutters general**<br>Gutters, downpipes and spreaders, including *eaves* gutters/spoutings are required for the drainage of *roof* water, and shall:<br>a) Be to the minimum dimensions shown in this Acceptable Solution, or calculated to provide capacity that meets the requirements of NZBC clause E1, whichever is the greater<br>…<br>**8.1.6.1 Internal gutters**<br>Internal gutters shall:<br>…<br>d) Have capacity that meets the requirements of NZBC clause E1 and have a freeboard depth of at least 20 mm, but in no case have any dimension less than those shown in Figure 52.<br>**COMMENT:**<br>Acceptable Solutions E1/AS1 and E1/AS2 provide means of calculating the capacity of internal gutters. If E1/AS1 is used, a freeboard depth of 20 mm must be added. If E2/AS1 is used, the calculation already includes a freeboard depth of 30 mm. |

| Current text | Proposed text |
|---|---|
| **Figure 52: Internal gutter for profiled metal**<br>20 mm min. freeboard in addition to calculated gutter capacity<br><br>(2) *Internal gutter* shall be sized to suit the roof catchment area, but shall be no less than shown in this figure.<br><br>Gutter depth calculated from E1/AS1 | **Figure 52: Internal gutter for profiled metal**<br>20 mm min. freeboard in addition to depth required for gutter capacity<br><br>(2) *Internal gutter* shall be sized to meet the requirements of NZBC clause E1 for the particular roof catchment area, but in no case have dimensions less than those shown in this figure.<br><br>[Refer to proposed figure on the next page] |
| **8.5.6 Roof and deck drainage**<br>…<br>**COMMENT:**<br>Refer to E1/AS1 for specific drainage requirements outside the scope of this Acceptable Solution.<br><br>Seams in gutters are particularly difficult to form at outlets through *enclosed balustrade walls*, and the risk of failure is high. Failure of a seam can result in damage to underlying *walls*. | **8.5.6 Roof and deck drainage**<br>…<br>**COMMENT:**<br>Membrane roof and deck drainage must comply with NZBC clause E1, and Acceptable Solutions E1/AS1 and E1/AS2 are options for achieving such compliance. However any design that does not also meet the requirements of this Acceptable Solution is outside its scope.<br><br>Seams in gutters are particularly difficult to form at outlets through *enclosed balustrade walls*, and the risk of failure is high. Failure of a seam can result in damage to underlying *walls*. |
| **8.5.10 Gutters**<br>*Deck* gutters and internal outlets shall be constructed as shown in Figure 64.<br><br>**COMMENT:**<br>Internal outlets should have a dome-type cover to reduce risk of blockage, except where this could constitute a pedestrian hazard. | **8.5.10 Gutters**<br>*Deck* gutters and internal outlets shall have dimensions to provide capacity that meets the requirements of NZBC clause E1, and shall be constructed as shown in Figure 64.<br>**COMMENT:**<br>Acceptable Solutions E1/AS1 and E1/AS2 provide means of calculating the capacity of internal gutters.<br>Internal outlets should have a dome-type cover to reduce risk of blockage, except where this could constitute a pedestrian hazard. |
| **Figure 64: Gutters and outlets in membrane**<br>[No equivalent note] | **Figure 64: Gutters and outlets in membrane**<br>NOTE: Gutters shall be sized to meet the requirements of NZBC clause E1 for the particular catchment area, but in no case have dimensions less than those shown in these figures.<br>[Refer to proposed figure on the following pages] |

## Proposed E2/AS1 Figure 52: Examples for waterproofing through shower walls

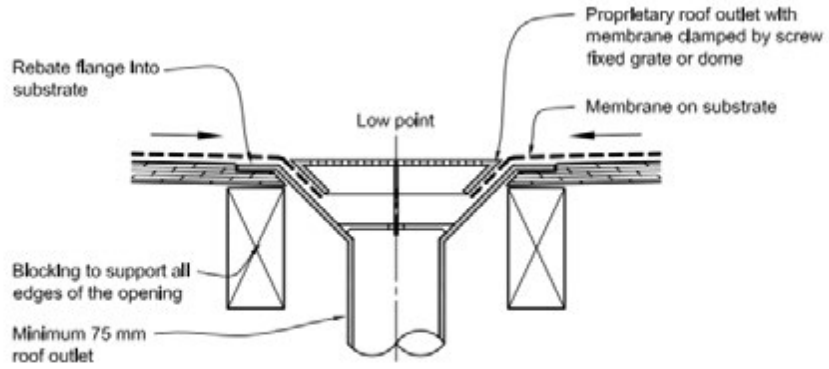
**Figure 52:** **Internal gutter for profiled metal**
Paragraphs 4.3, 4.5, 8.1.6.1 and 8.4.16



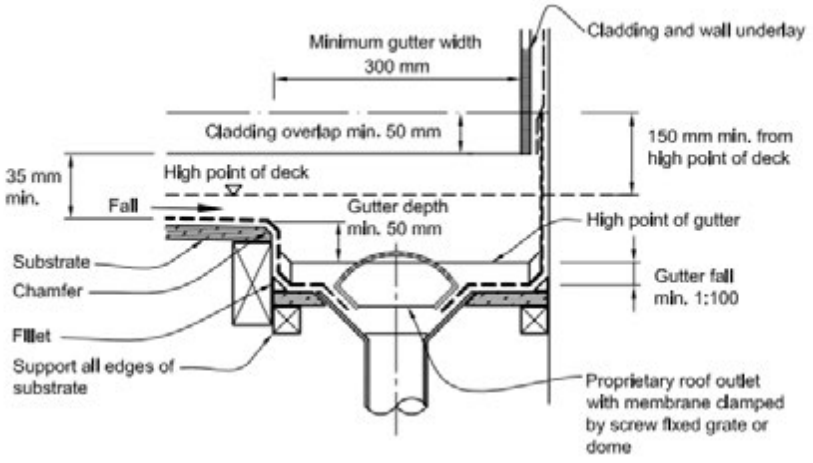

NOTE:
(1) Butyl rubber gutter lining to comply with clause 4.3.9. Butyl cross joins in gutter are not permitted.
(2) *Internal gutter* shall be sized to meet the requirements of NZBC clause E1 for the particular roof catchment area, but in no case have dimensions less than those shown in this figure.
(3) 1:100 minimum gutter fall.
(4) For gutter drainage refer Paragraph 8.1.6.1.

## Proposed E2/AS1 Figure 64: Gutters and outlets in membrane

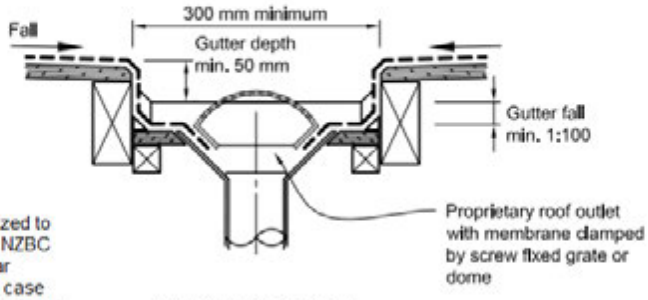
**Figure 64:** **Gutters and outlets in membrane**
Paragraphs 8.5.6 and 8.5.10




(a) TYPICAL ROOF OUTLET




(b) EDGE GUTTER




NOTE: Gutters shall be sized to meet the requirements of NZBC clause E1 for the particular catchment area, but in no case have dimensions less than those shown in these figures.

(c) CENTRAL GUTTER

# E3 Internal Moisture

## MBIE proposes to amend the Acceptable Solution E3/AS1 and issue a new Acceptable Solution E3/AS2

1. **Overflow from free water:** Amend the provisions in E2/AS1 for overflow from free water in adjoined household units to provide more flexibility by allowing the use of integrated overflows in sanitary fixtures
2. **Internal wet area membranes:** Issue a new Acceptable Solution (E3/AS2) for using internal wet area membranes in situations such as tiled bathroom floors and showers
3. **Align E3/AS1 and E3/AS2:** Amend some provisions of E3/AS1 to remove less reliable construction options and to align with the proposed E3/AS2

## Item 1 – Overflow from free water: Amend the requirement for overflow from free water in adjoined household units to provide clarity

Provide new provisions for the use of integrated sanitary fixture overflows as an alternative to the use of floor wastes and clarify that component failures such as burst pipes are not seen as an accidental overflows. This change could in some situations remove the requirement to install floor wastes in kitchens and laundries to protect adjoining units from damage from free water.

| Current text | Proposed text |
|---|---|
| **E3 References** | |
| | BS EN 274:- Waste fittings for sanitary appliances<br>Part 2: 2002 Test methods<br><br>Where quoted:<br>AS1 2.0.2 |
| | AS/NZS 2588: 2018 Gypsum plasterboard<br><br>Where quoted:<br>AS1 3.1.2 |
| | AS/NZS 2908:- Cellulose-cement products<br>Part 2:2000 Flat Sheets<br><br>Where quoted:<br>AS1 3.1.2 |
| | AS/NZS 4858: 2004 Wet area membranes<br><br>Where quoted:<br>AS1 3.3.1.2 |
| **E3/AS1** | |
| | **2.0.2** Household kitchen sinks and laundry tubs that have an integrated overflow with a minimum flow rate of 0.25 l/s do not require additional overflow provision such as a floor waste where;<br>a) the maximum flow rate from the taps is less than the flow rate of the integrated overflow for that sink or tub, or<br>b) the water supplies to the inlet taps for that sink or tub are fitted with proprietary flow restrictors (such as cartridges) to limit the tap flow rate to |

| Current text | Proposed text |
|---|---|
| | less than the flow rate of the integrated overflow for the sink or tub.<br>Integrated overflows shall be tested and verified as meeting the minimum flow rate using BS EN 274 |
| | **2.0.3** No floor waste is required solely to account for component or hose failure in a *sanitary appliance* where there is containment and facility for the *sanitary appliance* discharge pipe to be connected, directly and mechanically, into the *plumbing system*.<br><br>**COMMENT:**<br>Failure of a component (i.e. a washer) or hose (i.e. burst hose) of a sanitary appliance is not seen as an accidental overflow. |
| **2.1 Containment**<br>**2.1.1** Containment may be achieved by using *impervious* floor coverings which are continuous and coved or joints sealed where they meet the wall (See Figure 1). | **2.1 Containment**<br>**2.1.1** Containment may be achieved by using *impervious* floor coverings which either:<br>a) extend to all walls of the room and are continuous and coved or joints sealed where they meet the wall (See Figure 1), or<br>b) extend at least 1.5m from all water sources in open-plan rooms. |

## Item 2 – Internal wet-area membranes: Issue a new Acceptable Solution E3/AS2 for using internal wet-area membranes in situations such as tiled bathroom floors and showers (E3/AS2)

The proposal is to cite the Waterproofing Membrane Association Inc (WMAI) Code of Practice for Internal Wet-area Membrane Systems (IWAM) as an Acceptable Solution for relevant parts of NZBC clauses E3.3.2-3.3.6.

### Proposed text

#### E3 References

**Waterproofing Membrane Association NZ Inc.**
Code of Practice for Internal Wet-area Membrane Systems

#### E3/AS2

**Acceptable Solution E3/AS2**
**Internal Wet-area Membranes**
Building work involving internal wet-area membranes that are installed in accordance with sections 1 – 4 of the Waterproofing Membrane Association Incorporated (WMAI) Code of Practice for Wet Area Membranes (IWAM) will comply with, and may exceed the requirements of, New Zealand Building Code (NZBC) clauses E3.3.2 – E3.3.6 when installed as described below:

- E3.3.2: The building work involving internal wet-area membranes includes a floor waste where shown by the IWAM Code of Practice, in spaces containing sanitary fixtures or sanitary appliances.
- E3.3.3: The building work involving internal wet-area membranes is installed in conjunction with an over-surface finish that is easy to clean, to form the floor surfaces of a space containing sanitary fixtures or sanitary appliances
- E3.3.4: The building work involving internal wet-area membranes is installed in conjunction with an over-surface finish that is easy to clean, to form the wall surfaces adjacent to sanitary fixtures or sanitary appliances
- E3.3.5: The building work involving internal wet-area membranes is installed in conjunction with an over-surface finish that is easy to clean, to form the surfaces of building elements that are likely to be splashed or become contaminated in the course of the intended use of the building
- E3.3.6: The building work involving internal wet-area membranes is installed to form the surfaces of building elements that are likely to be splashed

Within the IWAM Code of Practice, text that is WMAI commentary is non-mandatory and does not form part of this Acceptable Solution. Such text is shown in italics on a grey background within the IWAM Code of Practice.

**Supporting Information**
The WMAI code of practice for wet area membranes is available from XXXXXXXXXX

**Effective use**

| Proposed text |
| --- |
| The IWAM is applicable to internal wet-area waterproof membrane systems, including their substrates, for bathrooms, kitchens and laundries within buildings. Facilities such as industrial processing areas (for instance a cowshed or an industrial food making facility), or the surrounds and changing facilities of internal swimming pools or spas, are outside its scope.<br><br>**Avoiding problems**<br>Wet-area waterproof membrane systems that will be installed in conjunction with specialist systems such as underfloor heating and sound insulation systems are outside the scope of this Acceptable Solution.<br><br>Over-surface finishing work, such as tiling, is outside the scope of this Acceptable Solution. Where an over-surface must be easy to clean to enable compliance with NZBC clauses such as E3.3.2 – E3.3.5, compliance of that finish must demonstrated by other means.<br><br>**Other requirements of clause E3**<br>E3/AS2 is a means of demonstrating that building work involving internal wet-area membranes will comply with, and may exceed the requirements of, parts of the New Zealand Building Code (NZBC) clauses E3.3.2 – E3.3.6 when installed as described in this Acceptable Solution.<br><br>Building designers will also need to identify how the building work addresses NZBC clause E3.3.1, which requires an adequate combination of thermal resistance, ventilation, and space temperature to certain spaces where moisture may be generated or may accumulate. |

## Item 3 – Align E3/AS1 and E3/AS2: Amend E3/AS1 in association with the proposed E3/AS2 for wet area membranes

In conjunction with the introduction of the new Acceptable Solution E3/AS2 for internal wet-area membranes, amendments will be made to E3/AS1.

| Current text | Proposed text |
|---|---|
| **E3/AS1** | |
| **3.1.1 Floors**<br>The following linings and finishes to floors satisfy the performance for *impervious* and easily cleaned surfaces in areas exposed to watersplash:<br><br>a) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints.<br>b) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use.<br>c) Cement based solid plaster or concrete having a steel trowel or polished finish, (semi-gloss or gloss paint must be used if a paint finish is required).<br>d) Cork tile or sheet sealed with waterproof applied coatings and with sealed joints.<br>e) Monolithic applied coatings having a polished non-absorbent finish (e.g. terrazzo).<br>f) A timber or timber based product such as particleboard sealed with waterproof applied coatings. | **3.1.1 Floors**<br>The following finishes to floors satisfy the performance for *impervious* and easily cleaned surfaces in areas likely to be splashed in the course of the intended use of the building, as well as areas adjacent to *sanitary fixtures* and *sanitary appliances*:<br>a) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints and sealed or coved at edges where watersplash may occur.<br>b) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use. All edges of the tiled area must be sealed or coved, and tiles must be laid on a continuous impervious substrate or a membrane specified by the manufacturer as being suitable for the tiles, substrate material and the environment of use. |
| **COMMENT:**<br>In domestic situations where the bathroom is used mainly by adults, carpet may be acceptable provided it is laid over an *impervious* surface. In these circumstances a particleboard floor finished with three coats of polyurethane would be considered *impervious*. | **COMMENT:**<br>Other floor finishes may also be capable of satisfying the performance for impervious and easily cleaned, if installed in a manner that prevents gaps or cracks within the finish and at any parts of its perimeter that are exposed to water splash, and/or if the surface is sealed with a suitable durable coating. However such other finishes are outside the scope of this Acceptable Solution. |

| Current text | Proposed text |
|---|---|
| | Water can penetrate behind or under floor finishes in situations where watersplash occurs regularly (such as around shower enclosures or the fronts of built-in baths), unless these edges are sealed or coved. |
| **3.1.2 Walls**<br>The following linings and finishes to walls satisfy the performance for *impervious* and easily cleaned surfaces in areas exposed to watersplash:<br><br>a) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints.<br>b) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use.<br>c) Cement based solid plaster or concrete having a steel trowel or polished finish (semi-gloss or gloss paint must be used if a paint finish is required).<br>d) Cork tile or sheet sealed with waterproof applied coatings.<br>e) Monolithic applied coatings having a polished non-absorbent finish (e.g. terrazzo).<br>f) Sheet linings finished with vinyl coated wallpaper, or semi-gloss or gloss coating.<br>g) Water resistant sheet linings finished with decorative high pressure laminate or factory applied polyurethane or resin.<br>h) Modular or multiple lining units which are themselves *impervious* and easily cleaned, and are installed with *impervious* joints.<br>i) Timber or timber based products such as particleboard sealed with waterproof applied coatings. | **3.1.2 Walls**<br>The following linings and finishes to walls satisfy the performance for *impervious* and easily cleaned surfaces in areas adjacent to *sanitary fixtures* or *sanitary appliances*, or likely to be splashed in the course of the intended use of the building:<br>a) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints.<br>b) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use.<br>c) Sheet linings finished with a semi-gloss or gloss coating.<br>d) Water resistant sheet linings finished with decorative high pressure laminate or factory applied polyurethane or resin, and installed with *impervious* joints (see Figure 2).<br>**COMMENT:**<br>Other wall linings and finishes may also be capable of satisfying the performance for impervious and easily cleaned, if installed in a manner that prevents gaps or cracks within the finish and at any parts of its perimeter that are exposed to water splash, and/or if the surface is sealed with a suitable durable coating. However such other finishes are outside the scope of this Acceptable Solution. |

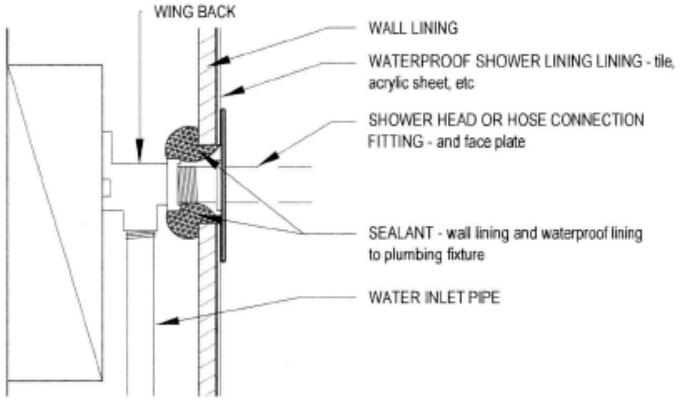
| Current text | Proposed text |
|---|---|
| **3.2.1 Linings**<br>Where walls and ceilings to sanitary rooms are lined with modular or multiple lining sheets (see Figure 2), the lining system shall:<br>a) Have *impervious* joints, or<br>b) Be fixed over an *impervious* substrate | **3.2.1 Joints between sanitary fixtures and impervious floor finishes**<br>Where sanitary fixtures abut *impervious* floor finishes, the base of the fixture must be sealed to the *impervious* floor finish. |
| **3.3.1 Showers**<br>All shower spaces shall have *impervious* floor and wall finishes. Lining materials and finishes listed in Paragraphs 3.1.1 and 3.1.2 satisfy this requirement except that within shower enclosures or a 1500 mm horizontal radius from the shower rose where there is no shower enclosure (see Figure 5):<br>a) The following materials shall not be used:<br>i. Cork tile or sheet sealed with waterproof applied coatings,<br>ii. Sheet linings finished with vinyl coated wallpaper, or semi-gloss or gloss coating.<br>b) Ceramic or stone tile finishes shall be laid on a continuous *impervious* substrate or membrane. (See Figure 4 (c).) | **3.3.1 Showers**<br>All shower spaces shall have *impervious* floors or floor finishes and *impervious* wall linings or wall finishes.<br><br>The *impervious* shower wall linings or wall finishes shall extend up the wall to the higher of 1800 mm above the shower floor, or 300 mm above the shower rose.<br><br>The top edge of *impervious* shower wall linings or wall finishes shall be sealed to the wall behind (or to the ceiling if full height) to prevent condensation penetrating behind the shower wall linings or wall finishes.<br><br>Penetrations in the shower wall for tapware, mixers, roses etc. shall be waterproofed with a proprietary flange system or with sealant (refer Figure 6), installed in a way that allows easy access when replacing washers, ceramic discs and o-rings.<br><br>COMMENT<br>Some tapware manufacturers do not recommend that sealant alone be used to waterproof the penetration in a shower lining.<br><br>**3.3.1.1 Shower floor materials**<br>Within shower enclosures, or within a 1500 mm horizontal radius from the shower rose where there is no shower enclosure such as a wall, screen, door or curtain (see Figure 5), one of the following materials or finishes to floors shall be used:<br>a) Plastic or stainless steel shower trays<br>b) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints, and coved at edges |

| Current text | Proposed text |
|---|---|
| | c) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use. The shower must also have tiled walls (see Paragraph 3.3.1.1 c)), and tiles must be laid either:<br>i) Within a shower tray specified by the manufacturer as being suitable for the tiles; or<br>ii) On a membrane specified by the manufacturer as being suitable for the tiles, substrate material and the environment of use.<br><br>**3.3.1.2 Shower wall lining and finish materials**<br>Within shower enclosures or within a 1500 mm horizontal radius from the shower rose where there is no shower enclosure such as a wall, screen, door or curtain (see Figure 5), one of the following linings and finishes to walls shall be used:<br>a) Plastic shower wall liners, either as a single component without joints, or installed with waterproof joints<br>b) Integrally waterproof sheet material (e.g. polyvinylchloride) with sealed joints.<br>c) Ceramic or stone tiles having 6% maximum water absorption, waterproof grouted joints, and bedded with an adhesive specified by the tile manufacturer as being suitable for the tiles, substrate material and the environment of use. Tiles must be laid on a membrane specified by the manufacturer as being suitable for the tiles, substrate material and the environment of use.<br>d) Water resistant sheet linings finished with decorative high pressure laminate or factory applied polyurethane or resin, and installed with *impervious* joints (see Figure 2).<br><br>**3.3.1.3 Showers over baths**<br>For showers over baths, the shower wall lining shall lap over and be sealed to the rim of the bath. Either the bath rim must be recessed into |

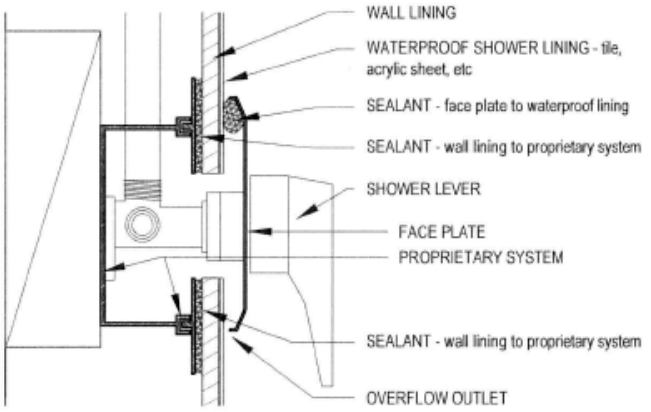
| Current text | Proposed text |
|---|---|
| | the wall framing, or the shower lining must be packed out to suit the rim. A bath mould or flashing shall not be used for showers over baths.<br><br>**COMMENT**<br>Notches to recess the rim of a bath into the wall framing may require the use of over-sized framing members in order that the notches do not detrimentally affect structural performance of the wall. |
| **3.3.3** When enclosures, such as walls, screens, doors or curtains are used they shall be continuous from floor level or top of upstand to 1800 mm minimum above floor level and not less than 300 mm above the shower rose.<br>**3.3.4** Where shower trays are used, the junction between tray and wall linings shall be constructed in accordance with Figure 4 (a) or (b).<br>**3.3.5** Where the shower floor has no upstand or where a wall, screen, door or curtain is omitted, the floor shall have a fall of no less than 1:50 towards the floor waste. The fall shall apply to the floor area within a radius of 1500 mm taken from a point vertically below the shower rose, or from any wall within that radius. (See Figure 5.)<br>**3.3.6 Urinals**<br>Impervious wall shall extend horizontally at least 300 mm beyond each side of the urinal and vertically from floor level to a height of 1500 mm | **3.3.2.1** When enclosures, such as walls, screens, doors or curtains are used they shall be continuous from floor level or top of upstand to 1800 mm minimum above floor level and not less than 300 mm above the shower rose.<br>**3.3.2.2** Where shower trays are used, the junction between tray and wall linings shall be constructed in accordance with Figure 4 (a) or (b).<br>**3.3.2.3** Where the shower floor has no upstand or where a wall, screen, door or curtain is omitted, the floor shall have a fall of no less than 1:50 towards the floor waste. The fall shall apply to the floor area within a radius of 1500 mm taken from a point vertically below the shower rose, or from any wall within that radius. (See Figure 5.)<br>**3.3.3 Urinals**<br>Impervious wall shall extend horizontally at least 300 mm beyond each side of the urinal and vertically from floor level to a height of 1500 mm. |
| | **Figure 6: Examples for waterproofing through shower walls**<br>[Refer to figure on next page] |

## Proposed E3/AS1 Figure 6: Examples for waterproofing through shower walls

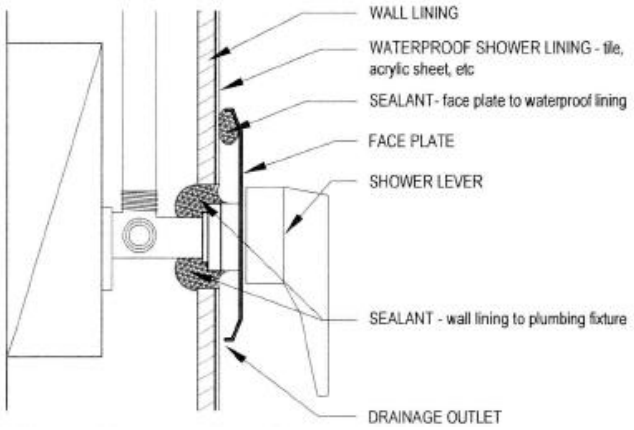
**Figure 6: Examples for waterproofing through shower walls**




**(a) Shower head or flexible hose connection**




**(b) Shower mixer and proprietary systems (example only)**




**(c) Shower Mixer sealant**

# G9 Electricity

## MBIE proposes to amend the Verification Method G9/VM1 and Acceptable Solution G9/AS1

1. **Electricity (Safety) Regulations 2010:** Reference the Electricity (Safety) Regulations 2010 in G9/VM1 and G9/AS1
2. **Domestic electrical installation exemption:** Amend G9/AS1 to add a new comment box to show how domestic electrical installations are exempted from requiring an authorised person under the Electricity Act 1992.
3. **Accessibility:** Amend G9/AS1 requirements for accessibility for light switches and plug sockets used by a person with a disability.

## Item 1 – Electricity (Safety) Regulations 2010: Reference the Electricity (Safety) Regulations 2010 in G9/VM1 and G9/AS1

The proposed new reference to the Electricity (Safety) Regulations 2010 will ensure consistency between these regulations and the Acceptable Solution and Verification Method for NZBC clause G9.

| Current text | Proposed text |
|---|---|
| **G9/VM1** | |
| **1.0.1** The following documents shall be accepted as a method of verifying compliance with the relevant Performances of NZBC G9:<br><br>AS/NZS 3000, NZECP 34, NZECP 36, and NZECP 54. | **1.0.1** Electrical installations within the scope of the Electricity (Safety) Regulations 2010, and that comply with the Electricity (Safety) Regulations 2010, will meet the performance criteria of NZBC G9. |
| **G9/AS1** | |
| **2.0.1** …<br>Paragraph 2.0.1 shall not apply in damp situations where the location of the light switch and plug sockets conflicts with AS/NZS 3000. | **2.0.2** In situations where the location of the light switches and plug sockets conflicts with the Electricity (Safety) Regulations 2010, the Electricity (Safety) Regulations 2010 must take precedence. |

## Item 2 – New comment on electrical exemptions: Amend G9/AS1 to add a new comment box clarifying which domestic electrical installations are exempted from requiring an authorised person under the Electricity Act 1992

Currently Acceptable Solution G9/AS1 paragraph 1.0.1 provides a solution for owner-occupiers of domestic residential premises to, in certain situations, carry out electrical work in accordance with the New Zealand Electrical Code of Practice (NZECP 51). However, because there is a lack of understanding from home owners as to why the compliance with NZECP 51 must be met, it is proposed to add a new comment box to clarify the reason for this requirement.

| Current text | Proposed text |
|---|---|
| **G9/AS1** | |
| **1.0.1** NZECP 51 is an Acceptable Solution for electrical installations within domestic dwellings. | **1.0.1** NZECP 51 is an Acceptable Solution for electrical installations within domestic dwellings.<br><br>**COMMENT:**<br>Regulation 57 of the Electricity (Safety) Regulations 2010 allows owner-occupiers of domestic residential premises to, in certain situations, carry out prescribed electrical work on a building in accordance with NZECP 51. However NZECP 51 does not allow new electrical work to be livened. New electrical work undertaken by owner-occupiers must be tested and certified by a licensed electrical inspector, who will liven the work upon certification. |

## Item 3 – Accessibility: Amend G9/AS1 requirements for light switches and plug sockets used by a person with a disability

Amend Paragraph 2.0.1 in G9/AS1 to align with NZS 4121:2001.

| Current text | Proposed text |
|---|---|
| **G9/AS1** | |
| **2.0.1** In *buildings* intended for use by *persons with disabilities*, light switches and *socket outlets* shall comply with the following requirements: | **2.0.1** In *buildings* intended for use by *persons with disabilities*, light switches and *socket outlets* shall comply with the following requirements: |
| a) All light switches shall be horizontally aligned with door handles. | a) All light switches shall be horizontally aligned with door handles at 900 – 1200 mm above finished floor level. |
| b) The toggle, rocker, push pad, or push button control of light switches shall project clear of the switch plate. | b) The toggle, rocker, push pad, or push button control of light switches shall project clear of the switch plate. |
| **COMMENT:**<br>It is recommended that the width of any push pad or button be no less than 20 mm. | **COMMENT:**<br>It is recommended that the width of any push pad or button be no less than 20 mm. |
| c) *Socket outlets* in *accessible* accommodation units shall be fixed between 500 mm and 1200 mm above the finished floor level and at least 500 mm from corners. At least one room light shall have a bedside switch. | c) *Socket outlets* in *accessible* accommodation units shall be fixed between 500 mm and 1200 mm above the finished floor level and at least 500 mm from corners. At least one room light shall have a bedside switch.<br>d) For *accessible* accommodation, switches and socket outlets shall contrast visually to their surroundings. |

# G13 Foul water

## MBIE proposes to amend the Acceptable Solutions G13/AS1, G13/AS2, and G13/AS3

1. **Modify Standard AS/NZS 3500.2:** Amend G13/AS3 to modify two additional clauses within AS/NZS 3500.2:2018 *Sanitary plumbing and drainage*
2. **Referenced Standards:** Amend G13/AS1 and G13/AS2 to update references to product manufacturing and installation Standards
3. **Remove G13/AS3 Standard reference:** Amend G13/AS3 to remove the reference to AS/NZS 2032:2006 *Installation of PVC pipe systems,* as this Standard is referenced within all other Acceptable Solutions for NZBC clause G13
4. **Editorial:** Amend G13.2, G13/AS1 and G13/AS2 to correct cross referencing and spelling errors

## Item 1 – Modify Standard AS/NZS 3500.2: Amend G13/AS3 to modify two additional clauses within AS/NZS 3500.2:2018 *Sanitary plumbing and drainage*

The proposal amends Acceptable Solution G13/AS3 to add two additional modifications to the referencing of AS/NZS 3500:2018 Part 2 - *Sanitary plumbing and drainage.*

The new modifications are intended to ensure that the normative text with AS/NZS 3500:2018 Part 2 supports the changes made in 2018 to figure 4.9.1(a) *45° Junction at grade* to reduce the probability of blockages within drains occurring.

| Current text | Proposed text |
|---|---|
| **G13/AS3** | |
| **2.0.2 Modifications to AS/NZS 3500.2**<br>**Clause 2.2** Delete and replace with "Materials and products shall comply with NZBC B2 and G13/AS1 Paragraph 2.0 Materials".<br>**Section 3.19** Delete section.<br>**Section 4.4** Replace "inspection shafts" with "access point" in this section.<br>**Clause 4.6.6** This applies only to Housing.<br>**Clause 5.6** Delete and replace with "Drains in other than stable ground shall be subject to specific design." | **2.0.2 Modifications to AS/NZS 3500.2**<br>**Clause 2.2** Delete and replace with "Materials and products shall comply with NZBC B2 and G13/AS1 Paragraph 2.0 Materials".<br>**Section 3.19** Delete section.<br>**Section 4.4** Replace "inspection shafts" with "access point" in this section.<br>**Clause 4.6.6** This applies only to Housing.<br>**Clause 4.9.1** Delete and replace with<br>"**4.9.1 Drains installed at grade**<br>**4.9.1.1 General**<br>The connection of any drain to a graded drain shall be by means of a junction with an upstream angle not greater than 45° and shall conform to the following:<br>(a) Double 45° junctions shall not be used.<br>(b) Where unequal junctions are used, the invert of the branch drain shall be at least 10 mm higher than the soffit of the drain to which it connects.<br>**4.9.1.2 New installations**<br>Where a junction is used to make the connection of a DN 100 branch drain to a main drain of the same size, the entry level of the branch drain shall be elevated at an incline of not less than 15° above the horizontal.<br>NOTE 1: A typical example is shown in Figure 4.9.1(a)<br>NOTE 2: Positioning the junction a minimum of 15° above horizontal removes the probability of the partial backwash of a discharge into the branch causing stranding that leads to blockages in the drain.<br>**4.9.1.3 Other installations** |

| Current text | Proposed text |
|---|---|
| | For repairs or extensions to existing installations, or where the main and branch drains are not DN 100, the entry level of the branch drain may be on grade.<br>NOTE 1: Where sufficient height is available in existing installations, the provisions of Clause 4.9.1.2 should be followed to avoid the potential for blockages."<br>**Clause 5.6** Delete and replace with "Drains in other than stable ground shall be subject to specific design."<br>**Clause 6.6.2.4** Delete and replace with<br>"**6.6.2.4 Junctions installed at grade**<br>**6.6.2.4.1 General**<br>Discharge pipes shall be joined to each other by means of a 45° junction. Where unequal size junctions are used, the invert of the branch pipe shall be 10 mm higher than the soffit of the pipe to which it connects.<br>**6.6.2.4.1 New installations**<br>Where a junction is used to make the connection of a DN 100 branch drain to a main drain of the same size, the entry level of the branch drain shall be elevated at an incline of not less than 15° above the horizontal.<br>NOTE 1: A typical example is shown in Figure 4.9.1(a)<br>NOTE 2: Positioning the junction a minimum of 15° above horizontal removes the probability of the partial backwash of a discharge into the branch causing stranding that leads to blockages in the drain.<br>**6.6.2.4.2 Other installations**<br>For repairs or extensions to existing installations, or where the main and branch drains are not DN 100, the entry level of the branch drain may be on grade.<br>NOTE 1: Where sufficient height is available in existing installations, the provisions of Clause 6.6.2.4.1 should be followed to avoid the potential for blockages." |

## Item 2 – Referenced Standards: Amend G13/AS1 and G13/AS2 to update references to product manufacturing and installation Standards

The proposal updates a number of standard references within G13/AS1 and G13/AS2 to align with those currently used for product manufacturing and installation of sanitary plumbing and foul water drainage system components. As part of the proposal, the reference to EN 12380 is amended in the text of G13/AS1 to state BS EN 12380 to reflect the referenced standard.

| Current text | Proposed text |
|---|---|
| **G13 References** | |
| AS/NZS 1260: 2009 PVC-U Pipes and fittings for drain, waste and vent application<br>*Amend: 1, 2* | AS/NZS 1260: 2017 PVC-U pipes and fittings for drain, waste and vent applications |
| AS/NZS 2280: 2014 Ductile iron pipes and fittings<br>*Amend: 1* | AS/NZS 2280: 2014 Ductile iron pipes and fittings<br>*Amend: 1, 2* |
| AS/NZS 2566.2: 2002 Buried Flexible pipelines - Installation<br>*Amend: 1* | AS/NZS 2566:- Buried flexible pipelines<br>Part 2: 2002 Installation<br>*Amend: 1, 2, 3* |
| AS/NZS 3518: 2013 Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications | AS/NZS 3518: 2013 Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications<br>*Amend: 1* |
| AS/NZS 4130: 2009 Polyethylene (PE) pipes for pressure applications<br>*Amend: 1* | AS/NZS 4130: 2018 Polyethylene (PE) pipes for pressure applications |
| AS/NZS 5065: 2005 Polyethylene and polypropylene pipe and fittings for drainage and sewerage applications<br>*Amend: 1* | AS/NZS 5065: 2005 Polyethylene and polypropylene pipe and fittings for drainage and sewerage applications<br>*Amend: 1, 2* |
| EN 12380: 1999 Air admittance valves for drainage systems – Requirements and test methods | BS EN 12380: 2002 Air admittance valves for drainage systems. Requirements, test methods and evaluation of conformity |
| ASSE 1050: 1991 Performance requirements for air admittance valves for plumbing DWV systems stack type devices | ASSE 1050: 2009 Performance requirements for stack air admittance valves for sanitary drainage systems |
| ASSE 1051: 1992 Performance requirements for air admittance valves for plumbing drainage systems | ASSE 1051: 2009 Performance requirements for individual and branch type air admittance valves for sanitary drainage systems |
| **G13/AS1** | |
| **Table 1: Pipes, traps and fittings**<br>…ASSE 1050 or ASSE 1051, EN 12380, AS/NZS 4936… | **Table 1: Pipes, traps and fittings**<br>…ASSE 1050 or ASSE 1051, BS EN 12380, AS/NZS 4936… |

| Current text | Proposed text |
|---|---|
| **5.8.2** *Air admittance valves* shall be manufactured to ASSE 1050, ASSE 1051, EN 12380 or AS/NZS 4936. | **5.8.2** *Air admittance valves* shall be manufactured to ASSE 1050, ASSE 1051, BS EN 12380 or AS/NZS 4936. |

## Item 3 – Remove G13/AS3 Standard reference: Amend G13/AS3 to remove the reference to AS/NZS 2032:2006 Installation of PVC pipe systems, as this Standard is referenced within all other Acceptable Solutions for NZBC clause G13

The proposal amends Acceptable Solution G13/AS3 by deleting paragraph 1.0, which references AS/NZS 2032:2006 *Installation of PVC pipe systems* as an Acceptable Solution for the installation of PVC-U pipe and fittings. The G13/AS3 referencing of AS/NZS 2032:2006 is no longer required as this standard is referenced in all other Acceptable Solutions for NZBC clause G13.

The proposal also amends Acceptable Solution G13/AS3 to improve the referencing of AS/NZS 3500:2018 Part 2 - *Sanitary plumbing and drainage.*

| Current text | Proposed text |
|---|---|
| **G13/AS3** | |
| **Acceptable Solution G13/AS3**<br>**Plumbing and drainage** | **Acceptable Solution G13/AS3**<br>**Sanitary plumbing and drainage** |
| **1.0 Installation of PVC-U pipe**<br>**1.0.1** AS/NZS 2032 is an Acceptable solution for the installation of PVC-U pipe and fittings, but may exceed the performance criteria of NZBC G13.<br><br>**2.0 AS/NZS 3500.2**<br>**2.0.1** AS/NZS 3500.2, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, and 16, as modified by paragraph 2.0.2, is an Acceptable Solution for plumbing and drainage.<br><br>**2.0.2 Modifications to AS/NZS 3500.2**<br>**Clause 2.2** Delete and replace with "Materials and products shall comply with NZBC B2 and G13/AS1 Paragraph 2.0 Materials".<br>**Section 3.19** Delete section.<br>**Section 4.4** Replace "inspection shafts" with "access point" in this section.<br>**Clause 4.6.6** This applies only to Housing.<br>**Clause 5.6** Delete and replace with "Drains in other than stable ground shall be subject to specific design." | **1.0 AS/NZS 3500.2**<br>**1.0.1** AS/NZS 3500.2, as modified by paragraph 1.0.2, is an Acceptable Solution for the design and installation of sanitary plumbing and drainage systems.<br><br>**1.0.2 Modifications to AS/NZS 3500.2**<br>**Clause 2.2** Delete and replace with "Materials and products shall comply with NZBC B2 and G13/AS1 Paragraph 2.0 Materials".<br>**Section 3.19** Delete section.<br>**Section 4.4** Replace "inspection shafts" with "access point" in this section.<br>**Clause 4.6.6** This applies only to Housing.<br>**Clause 5.6** Delete and replace with "Drains in other than stable ground shall be subject to specific design."<br>**Section 14** Delete section. |

## Item 4 – Editorial: Amend G13.2, G13/AS1 and G13/AS2 to correct cross referencing and spelling errors

This proposal will amend the following to correct referencing and spelling errors.

- New Zealand Building Code clause G13 Foul Water, Functional Requirement
- Acceptable Solution G13/AS1 Paragraph 6.2.2 COMMENT
- Acceptable Solution G13/AS2 Paragraph 6.1.2

| Current text | Proposed text |
|---|---|
| **New Zealand Building Code Clause C13 Foul Water** | |
| **G13.2** *Buildings* in which *sanitary fixtures* and *sanitary applicances* using water-borne waste disposal are installed must be provided with— | **G13.2** *Buildings* in which *sanitary fixtures* and *sanitary appliances* using water-borne waste disposal are installed must be provided with— |
| **G13/AS1** | |
| **6.2.2** For PVC-U pipes carrying discharges of greater than 60°C, support for the pipe shall be in accordance with Paragraph 6.3.2 of AS/NZS 2032.<br>**COMMENT:**<br>Supports are required to ensure that the pipe gradient does not fall below minimum values given in Paragraph 4.2.1. | **6.2.2** For PVC-U pipes carrying discharges of greater than 60°C, support for the pipe shall be in accordance with Paragraph 6.3.2 of AS/NZS 2032.<br>**COMMENT:**<br>Supports are required to ensure that the pipe gradient does not fall below minimum values given in Paragraph 4.4.1. |
| **G13/AS2** | |
| **3.5.2 Water test**<br>AS/NZS 2032 Section 11 gives an acceptable method for ensuring watertightness of below ground PVC-U drainage pipework. | **3.5.2 Water test**<br>AS/NZS 2032 Section 7 gives an acceptable method for ensuring watertightness of below ground PVC-U drainage pipework. |