C/VM1

Verification Method for Solid Fuel Appliances

C/AS1

Acceptable Solution for Buildings with Sleeping (residential) and Outbuildings (Risk Group SH)

For New Zealand Building Code Clauses C1-C6 Protection from Fire
Using this Verification Method or Acceptable Solution

The Ministry of Business, Innovation and Employment may amend parts of this document at any time. People using this document should check on a regular basis whether new versions have been published. The current version can be downloaded from www.dbh.govt.nz/compliance-documents

Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the status of Verification Methods and Acceptable Solutions and explains other ways of achieving compliance.

Defined words (italicised in the text) are explained in the Building Code Clause A2 and in the Definitions section of this document. Classified uses of buildings are explained in the Building Code Clause A1.
Status of C/VM1 and C/AS1

This Verification Method C/VM1 and the Acceptable Solution C/AS1 in this document provide a means of compliance with the New Zealand Building Code Clauses C1-C6 Protection from Fire. C/VM1 and C/AS1 are issued under section 22 of the Building Act 2004 respectively as a Verification Method and an Acceptable Solution.

This Verification Method and Acceptable Solution provide one way that can be used to show compliance with the New Zealand Building Code Clauses C1-C6 Protection from Fire. Other ways of complying with the Building Code are described, in general terms, in the preface of the New Zealand Building Code Handbook.

When can you use C/VM1 and C/AS1

This Acceptable Solution and Verification Method are effective from 1 January 2017. They can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire. They do not apply to building consent applications submitted before 1 January 2017.

The previous version, Amendment 3, of this Acceptable Solution and Verification Method can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire until 30 May 2017. It can be used for building consent applications submitted before 31 May 2017.

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References

For the purposes of New Zealand Building Code compliance, the New Zealand and other Standards, and other documents referred to in this Verification Method and Acceptable Solution (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 this Verification Method and Acceptable Solution were published.

**Standards New Zealand**

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### New Zealand Legislation

Hazardous Substances and New Organisms Act 1996

AS1 1.1.5
Definitions

The full list of definitions for italicised words may be found in the New Zealand Building Code Handbook.

**Building** has the meaning given to it by sections 8 and 9 of the Building Act 2004.

**Building Act 2004 (the Building Act)** means the principal legislation dealing with building controls in New Zealand.

**Building Code** means the regulations made under section 400 of the Building Act 2004.

**Building element** Any structural and non-structural component or assembly incorporated into or associated with a building. Included are fixtures, services, drains, permanent mechanical installations for access, glazing, partitions, ceilings and temporary supports.

**Building height** Building height means the vertical distance between the floor level of the lowest occupied space above the ground and the top of the highest occupied floor, but not including spaces located within or on the roof that enclose stairways, lift shafts, or machinery rooms.

**Chimney** A non-combustible structure which encloses one or more flues, fireplaces or other heating appliances.

**Chimney back** The non-combustible wall forming the back of a fireplace.

**Chimney breast** The front fireplace wall construction above the fireplace opening.

**Chimney jamb** The side walls of a fireplace.

**Combustible** See non-combustible.

**Construct** in relation to a building, includes to design, build, erect, prefabricate, and relocate the building; and construction has a corresponding meaning.

**Dead end** That part of an open path where escape is possible in only one direction.

**Doorset** A complete assembly comprising a door leaf or leaves including any glazed or solid panels adjacent to or over the leaves within the door frame including hardware or other inbuilt features; and a door frame, if any, with its fixings to the wall and, for a sliding or tilting door, all guides and their respective fixings to the lintel, wall or sill.

**Early childhood centre (ECC)** means premises used regularly for the education or care of 3 or more children (not being children of the persons providing the education or care, or children enrolled at a school being provided with education or care before or after school) under the age of six—

a) by the day or part of a day; but

b) not for any continuous period of more than seven days.

ECC does not include home based early childhood services.

**Escape route** A continuous unobstructed route from any occupied space in a building to a final exit to enable occupants to reach a safe place, and shall comprise one or more of the following: open paths and safe paths.

**Definitions C/VM1 and C/AS1**

MINISTRY OF BUSINESS, INNOVATION AND EMPLOYMENT – 1 JULY 2014 I 9
**External wall** Any exterior face of a building within 30° of vertical, consisting of primary and/or secondary elements intended to provide protection against the outdoor environment, but which may also contain unprotected areas.

**Fire** The state of combustion during which flammable materials burn producing heat, toxic gases, or smoke or flame or any combination of these.

**Firecell** Any space including a group of contiguous spaces on the same or different levels within a building, which is enclosed by any combination of fire separations, external walls, roofs, and floors.

**Fire door** A doorset, single or multi-leaf, having a specific fire resistance rating, and in certain situations a smoke control capability, and forming part of a fire separation. The door, in the event of fire, if not already closed, will close automatically and be self-latching.

**Fireplace** A space formed by the chimney back, the chimney jambs, and the chimney breast in which fuel is burned for the purpose of heating the room into which it opens.

**Fire resistance rating** (FRR) The term used to describe the minimum fire resistance required of primary and secondary elements as determined in the standard test for fire resistance, or in accordance with a specific calculation method verified by experimental data from standard fire resistance tests. It comprises three numbers giving the time in minutes for which each of the criteria structural adequacy, integrity and insulation are satisfied, and is presented always in that order.

**Fire retardant** A substance or a treatment, incorporated in or applied to a material, which suppresses or delays the combustion of that material under specified conditions.

**Fire safety systems** means the combination of all active and passive protection methods used in a building to—
(a) warn people of an emergency; and
(b) provide for safe evacuation; and
(c) provide for access by, and the safety of, firefighters; and
(d) restrict the spread of fire; and
(e) limit the impact of fire on structural stability

**Fire separation** Any building element which separates firecells or firecells and safe paths, and provides a specific fire resistance rating.

**Fire stop** A material or method of construction used to restrict the spread of fire within or through fire separations, and having a FRR no less than that of the fire separation.

**Flammability index** (FI) That index number for flammability, which is determined according to the standard test method for flammability of thin flexible materials.

**Flue** The passage through which the products of combustion are conveyed to the outside.
Flue liner: Pipes or linings of fire clay, metal or fire brick that surrounds flues.

Flue system: A series of interconnecting flue pipe casings which form a safe passage for conveying products of combustion from within an appliance to the outside of a building or structure.

Foamed plastics: Combustible foamed plastic polymeric materials of low density (typically less than 100 kg/m³) and are classified as cellular polymers which are manufactured by creating a multitude of fine void (typically 90 to 98%) distributed more or less uniformly throughout the product. Examples of foamed plastics are latex foams, polyethylene foams, polyvinyl chloride foams, expanded or extruded polystyrene foams, phenolic foams, ureaformaldehyde foams, polyurethane foams and polychloroprene foams.

Comment:
1. Foamed plastics may be rigid or flexible, but rigid foams are the most common in building products. When burnt they tend to generate high levels of heat energy (kJ/kg) and varying quantities of smoke and other toxic gases depending on the nature and volume of the particular product.
2. Where doubt exists as to whether a building material is foamed plastics, an opinion should be sought from a person or organisation with appropriate skill and experience in fire engineering. That opinion should be included with the building consent application to the building consent authority.

Group Number: The classification number for a material used as a finish, surface, lining, or attachment to a wall or ceiling within an occupied space and determined according to the standard test methods for measuring the properties of lining materials.

Comment:
The method for determining a Group Number is described in C/VM2 Appendix A.

Handrail: A rail to provide support to, or assist with the movement of a person.

Hazardous substance: has the meaning ascribed to it by section 2 of the Fire Service Act 1975 and section 2 of the Hazardous Substances and New Organisms Act 1996.

Hearth: The insulating floor under the fire and in front and at the sides of the fireplace.

Household unit:
(a) means a building or group of buildings, or part of a building or group of buildings, that is—
   (i) used, or intended to be used, only or mainly for residential purposes; and
   (ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than 1 household; but
(b) does not include a hostel, boarding house, or other specialised accommodation.

HVAC: An abbreviation for heating, ventilating and airconditioning.

Insulating material: A material that has a thermal conductivity of less than 0.07 W/mK.

Insulation: In the context of fire protection, the time in minutes for which a prototype specimen of a fire separation, when subjected to the standard test for fire resistance, has limited the transmission of heat through the specimen.

Integrity: In the context of fire protection, the time in minutes for which a prototype specimen of a fire separation, when subjected to the standard test for fire resistance, has prevented the passage of flame or hot gases.

Comment:
The precise meaning of integrity depends on the type of building elements being treated and how it is defined in the standard test being used.

Life rating: The fire resistance rating to be applied to elements of construction that allows movement of people from their location in a building to a safe place.

Means of escape from fire: In relation to a building that has a floor area,—
   a) means continuous unobstructed routes of travel from any part of the floor area of that building to a place of safety; and
   b) includes all active and passive protection features required to warn people of fire and to assist in protecting people from the effects of fire in the course of their escape from the fire.

Comment:
Means of escape include features providing visibility in escape routes complying with F6 and signs complying with F8.
Multi-unit dwelling  Applies to a building or use which contains more than one separate household or family.

Non-combustible  Materials shall be classified as combustible or non-combustible when tested to AS 1530 Part 1.

Notional boundary  The boundary which for fire safety purposes, is assumed to exist between two buildings on the same property under a single land title.

Comment:  The notional boundary is assumed to exist in the space between the buildings and is positioned so that each of the buildings would comply with the provisions of the space separation having regards to the amount of its unprotected area. In practise if one of the buildings is existing, the position of the boundary will be set by the space separation factors for that building.

1. The siting of the new building which is adjacent to the existing building can be checked to see that it also complies, using a revised notional boundary location that is no closer than 1.0 metre from the existing building.
2. Where both buildings are new it is allowable to move the notional boundary between buildings. However in assessing fire spread from one building to the other and vice versa, the notional boundary should not be located any closer than 1.0 metre from the building that is receiving the radiation.

Occupant load  The greatest number of people likely to occupy a particular space within a building. It is determined by:

a) dividing the total floor area by the m² per person (occupant density) for the activity being undertaken, or

b) for sleeping areas, counting the number of sleeping (or care) spaces, or

c) for fixed seating areas, counting the number of seats.

Comment:  See Paragraphs 1.4.5 (for fixed seating) and 1.4.6 (for sleeping areas) where appropriate.

Occupied space  Any space within a building in which a person will be present from time to time during the intended use of the building.

Open path  That part of an escape route (including dead ends) within a firecell where occupants may be exposed to fire or smoke while making their escape.

Owner  In relation to land and any buildings on the land,—

(a) means the person who—

(i) is entitled to the rack rent from the land; or

(ii) would be so entitled if the land were let to a tenant at a rack rent; and

(b) includes—

(i) the owner of the fee simple of the land; and

(ii) for the purposes of Building Act sections 32, 44, 92, 96, 97, and 176(c), any person who has agreed in writing, whether conditionally or unconditionally, to purchase the land or any leasehold estate or interest in the land, or to take a lease of the land, and who is bound by the agreement because the agreement is still in force.

Penetration  A building element passing through an opening in a fire separation.

Comment:  A penetration may include, but is not limited to: pipes, cables, ducts, hoses, drains, cable trays, ropes, data outlets, power outlets, hatches, glazing, structural bracing etc.

People with disabilities  People whose ability to use buildings is affected by mental, physical, hearing or sight impairment.

Primary element  A building element providing the basic loadbearing capacity to the structure, and which if affected by fire may initiate instability or premature structural collapse.

Comment:  Suspended floors in multi-storey buildings are primary elements.

Property rating  The fire resistance rating to be applied to elements of construction that allows for protection of other property.

Relevant boundary  Relevant boundary means the boundary of an allotment that is other property in relation to the building in question and from which is measured the separation between the building and that other property, and for the external wall of any building, the relevant boundary is the nearest of—
(a) a boundary of a freehold allotment, except that if the other property is a road, railway line, or public open space, the relevant boundary is the boundary on the far side of that other property; or

(b) a boundary of a cross-lease or a company lease or a licence, except that if the other property is open space, the relevant boundary is the boundary on the far side of that other property; or

(c) a boundary shown on a unit plan (but excluding a boundary between a principal unit and its accessory unit), except that if the other property is open space and is common property, the relevant boundary is the boundary on the far side of that other property.

**Definitions C/VM1 and C/AS1**

- **Risk group** The classification of a building or firecells within a building according to the use to which it is intended to be put.
- **Safe place** A place, outside of and in the vicinity of a single building unit, from which people may safely disperse after escaping the effects of a fire. It may be a place such as a street, open space, public space or an adjacent building unit.

**Comment:**

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.

- **Secondary element** A building element not providing load bearing capacity to the structure and if affected by fire, instability or collapse of the building structure will not occur.
- **Smokecell** A space within a building which is enclosed by an envelope of smoke separations, or external walls, roofs, and floors.
- **Smoke control door** A doorset that complies with Appendix C, C6.1.2 of this acceptable solution.
- **Stability** In the context of fire protection is the support provided to a building element having an FRR, intended to avoid premature failure due to structural collapse as a result of applied load, dead and live loads or as a result of any additional loads caused by fire.
- **Standard test** A test method which is recognised as being appropriate for the fire protection properties being assessed.

**Comment:**

A list of standard test methods is given in Appendix C.

- **Structural adequacy** In the context of the standard test for fire resistance, is the time in minutes for which a prototype specimen has continued to carry its applied load within defined deflection limits.

**Comment:**

The fire design load should be as specified in B1/VM1.
**Surface finish** The combination of a surface coating and substrate material on surfaces of *building elements* exposed to view. It can be an applied decorative coating or the uncoated *building element* itself. For interior surfaces the requirements are evaluated in terms of a *Group Number*. For exterior surfaces the requirements are evaluated in terms of rate of heat release as determined by Appendix C, Paragraph C6.1.

**Unprotected area** In relation to an *external wall* of a *building*, this means:

a) Any part of the *external wall* which is not *fire* rated or has less than the required *FRR*, and

b) Any part of the *external wall* which has combustible material more than 1.0 mm thick attached or applied to its external face, whether for cladding or any other purpose.

Comment: *Unprotected area* includes non-*fire* rated windows, doors, or other openings, and non-*fire* rated *external wall construction*. 
1.1 Solid Fuel Appliances

Limiting heat transfer

1.1.1 Compliance with NZBC Performances C2.2 and C2.3 may be verified for solid fuel burning appliances by meeting the appropriate test requirements of AS/NZS 2918.
Acceptable Solution C/AS1
Part 1: General

1.1 Introduction and scope

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).

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.

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 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.

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.

Comment:
It is recommended that the commentary document for Acceptable Solutions C/AS1 to C/AS7 be read in conjunction with this Acceptable Solution.
### Table 1.1 Risk groups and Acceptable Solutions

<table>
<thead>
<tr>
<th>Acceptable Solution</th>
<th>Risk group</th>
<th>Applies to</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/AS1</td>
<td>Buildings with sleeping (residential) and outbuildings</td>
<td>SH</td>
</tr>
<tr>
<td>C/AS2</td>
<td>Sleeping (non institutional)</td>
<td>SM</td>
</tr>
<tr>
<td>C/AS3</td>
<td>Care or detention</td>
<td>SI</td>
</tr>
<tr>
<td>C/AS4</td>
<td>Public access and educational facilities</td>
<td>CA</td>
</tr>
<tr>
<td>C/AS5</td>
<td>Business, commercial and low level storage</td>
<td>WB</td>
</tr>
<tr>
<td>C/AS6</td>
<td>High level storage and other high risks</td>
<td>WS</td>
</tr>
<tr>
<td>C/AS7</td>
<td>Vehicle storage and parking</td>
<td>VP</td>
</tr>
</tbody>
</table>

**Comment:**

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 allows each *building* activity to be categorised in a *risk group*, which is the basis for determining fire safety features.  
   The *fire safety* requirements for *risk group* SH do not depend on the *occupant load* of the *firecells*.  

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.

**Scope**

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).

This includes the following:

a) Single *household units*

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*

c) Detached dwellings used as boarding houses for fewer than six people (not including members of the residing family)
d) Garages that are part of a household unit, and
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.

Outside the scope of this Acceptable Solution

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.

1.1.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

1.1.4 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Hazardous substances not covered by this Acceptable Solution

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.

1.2 Using this Acceptable Solution

1.2.1 The process for using this Acceptable Solution shall be as follows.

Step 1: Determine which Acceptable Solutions apply

a) 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.

b) DELIBERATELY LEFT BLANK

c) DELIBERATELY LEFT BLANK

d) DELIBERATELY LEFT BLANK
Comment:
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 on the same floor.

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.

Step 2: Determine the parameters for risk group SH

a) Establish the relevant building measurements (these will include building height, floor plans, wall openings and distances to relevant boundaries).

b) DELIBERATELY LEFT BLANK.

Comment:
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.

Step 3: Satisfy the fire safety requirements

Satisfy the fire safety requirements of this Acceptable Solution (refer to Parts 2-7), based on the building’s dimensions and features where required.

Primary risk groups

1.2.2 THIS PARAGRAPH DELIBERATELY LEFT BLANK

1.2.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

1.3 Alterations and changes of use to buildings

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.

Comment:
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.

Parts 1, 2, 3, and 4 of this Acceptable Solution may be 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.

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:

a) Age of the building
b) Importance level of the building
c) Extent of the alteration.

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

2.1 Provision of firecells

Firecell floor area limits

2.1.1 There are no requirements relating to firecells for risk group SH.

2.2 Fire safety systems

2.2.1 The fire safety systems required for risk group SH other than outbuildings are that each household unit shall be provided with Type 1 smoke alarms in accordance with Acceptable Solution F7/AS1. Alarm system types shall be as defined in Table 2.1.
### 2.3 Fire resistance ratings

#### FRR values

2.3.1 Unless explicitly stated otherwise in this Acceptable Solution, the fire resistance ratings (FRRs) that shall apply for this risk group are as follows:

- **Life rating** = 30 minutes.
- **Property rating** = 30 minutes.

**Comment:**
Throughout this Acceptable Solution, minimum FRRs are specified for particular situations. It is therefore essential to check for specific requirements.
Part 3: Means of escape

### CONTENTS

- 3.1  This paragraph deliberately left blank
- 3.2  Number of escape routes
- 3.3  Height and width of escape routes
- 3.4  Length of escape routes

---

### 3.1 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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### 3.2 Number of escape routes

Risk group SH may be served by a single escape route provided the permitted dead end open path distance specified in Paragraph 3.4 is not exceeded.

---

### 3.3 Height and width of escape routes

There are no restrictions (other than those required by other Building Code Clauses) on the height and width of escape routes for risk group SH.

---

### 3.4 Length of escape routes

An escape route in outbuildings may be any length, but the lengths of dead ends and total open paths in other buildings to which this Acceptable Solution applies shall not exceed the distances given in Table 3.2.

---

#### Table 3.2 Travel distances on escape routes

<table>
<thead>
<tr>
<th></th>
<th>Type 1 system only</th>
<th>NZS 4514 Interconnected Smoke Alarms</th>
<th>NZS 4517 Sprinkler system with Type 1 (in single household units only)</th>
<th>NZS 4515 Sprinkler system with Type 1</th>
<th>NZS 4515 Sprinkler system and NZS 4512 Smoke detection system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead end open path</td>
<td>25 m</td>
<td>35 m</td>
<td>35 m</td>
<td>40 m</td>
<td>50 m</td>
</tr>
<tr>
<td>Total open path</td>
<td>60 m</td>
<td>75 m</td>
<td>75 m</td>
<td>90 m</td>
<td>120 m</td>
</tr>
</tbody>
</table>

For definition of system types, see Table 2.1.

If 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 Service connection is not required.
Part 4: Control of internal fire and smoke spread

4.1 Fire separations

Each household unit, including any garage and escape routes in multi-unit dwellings, shall be fire separated from other household units and any escape routes with fire separations having an FRR of no less than 30/30/30.

Comment:
An ancillary unit such as a granny flat is a separate household unit to the primary dwelling, and there must be a fire separation between it and the primary dwelling.

4.2 Surface finishes

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

4.3 Foamed plastics or combustible insulating materials

Where foamed plastics or combustible insulating materials form part of a wall or ceiling system, the completed system (see comment) shall achieve a Group Number of not more than 3. The foamed plastics shall comply with the flame propagation criteria as specified in AS 1366 for the type of material being used. The above requirements do not apply to the following building elements:

a) Small areas of non-conforming product within a firecell with a total aggregate surface area of not more than 5.0 m²

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

c) Pipes and cables used to distribute power or services

d) Handrails and general decorative trim of any material such as architraves, skirtings and window components, including reveals, provided these do not exceed 5% of the surface area of the wall or ceiling they are part of.
e) Damp-proof courses, seals, caulking, flashings, thermal breaks and ground moisture barriers


g) Individual doorsets

h) Continuous areas of permanently installed openable wall partitions, having a surface area of not more than 25% of the divided room floor area or 5.0 m², whichever is the greater,

Comment:
The completed system may or may not include a surface lining product enclosing any insulation material from any adjacent occupied space. If a surface lining is not included, then the foamed plastics or combustible insulating materials when tested alone shall achieve a Group Number of 3, otherwise a surface lining is also required such that the completed system achieves a Group Number of 3 (see Appendix A of C/VM2). This paragraph applies to foamed plastics building materials whether exposed to view from the occupied space or enclosed.

The method of assigning the Group Number to a material is specified in Verification Method C/VM2 Appendix A.
Part 5: Control of external fire spread

CONTENTS
5.1 Fire resistance ratings
5.2 Roof projections
5.3 Exterior surface finishes
5.4 Carports and similar construction

5.1 Fire resistance ratings

5.1.1 Where the building is protected with a sprinkler system, external walls do not need an FRR.

Where the building is not protected with a sprinkler system, external walls shall have an FRR of no less than 30/30/30 in the following circumstances:

a) Outbuildings, single household units and attached side by side multi-unit dwellings where part of the external wall is less than 1.0 m and less than 90º from the relevant boundary. See Figure 5.1. The wall shall be fire rated to protect from both directions, and

b) Multi-unit dwellings located one above the other where the external wall is less than 5.0 m from the relevant boundary. If there are windows more than 1.0 m from the relevant boundary in a household unit wall requiring a FRR, the windows do not need to be fire rated.

5.2 Roof projections

5.2.1 Where the external wall is required to have an FRR, the eaves projection shall either have an FRR of 30/30/30 or the wall shall be extended to the underside of the roof.

5.2.2 Where roof eaves extend from an otherwise unrated external wall to within 650 mm of the relevant boundary, the total eaves construction and the external wall from which they project shall have an FRR of no less than 30/30/30.

5.3 Protection from a lower roof in multi-unit dwellings

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

a) The part of the roof within 5.0 m horizontally of the wall, or

b) Any part of the wall within 9.0 m vertically of the roof.

5.3.2 Fire rating of the roof is not required if the household unit is protected with a sprinkler system complying with NZS 4515.

Notional boundary – firecells on the same property

5.1.2 For firecells containing sleeping risk groups under common ownership in the same building, or in separate buildings on the same property, a notional boundary shall be used instead of the relevant boundary. The words relevant boundary shall be interpreted as notional boundary.
5.4 Exterior surface finishes

External wall cladding systems shall be tested to the standard test described in Appendix C C7.1 and the peak rate of heat release and the total heat released shall not exceed the limits given in Table 5.1.

These requirements do not apply if surface finishes are no more than 1 mm in thickness and applied directly to a non-combustible substrate.

5.5 Carports and similar construction

A carport is permitted to have walls and roof with 100% unprotected area provided that all the following conditions are met:

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

b) The carport and adjacent building are under the same ownership, and

c) For a roof plan area of no more than 40 m², no part of the roof is closer than 0.3 m to a relevant boundary.

### Table 5.1 Requirements for external wall claddings

<table>
<thead>
<tr>
<th>Distance to relevant boundary (angle between wall and boundary is less than 90°)</th>
<th>Peak heat release rate (kW/m²)</th>
<th>Total heat released (MJ/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1.0 m</td>
<td>100</td>
<td>25</td>
</tr>
<tr>
<td>Distance greater than or equal to 1.0 m and building height less than or equal to 10 m</td>
<td>No requirement</td>
<td>No requirement</td>
</tr>
<tr>
<td>Distance greater than or equal to 1.0 m and building height greater than 10 m</td>
<td>Unsprinklered</td>
<td>Sprinklered to NZS 4515</td>
</tr>
</tbody>
</table>

Unsprinklered Sprinklered to NZS 4515

Note: Table 5.1 applies to separate buildings. It does not apply to household units within the same building whether they are side by side or one above the other.
6.1 Fire Service vehicular access

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

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

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

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

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

b) Be trafficable in all weathers, and

c) Have a minimum width of 4.0 m, and

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.
The design, construction and/or installation of certain types of fixed appliances using controlled combustion and other fixed equipment is specified as follows.

### 7.1 Solid fuel appliances

**7.1.1 AS/NZS 2918**, with the modifications given in Paragraph 7.1.2, is an Acceptable Solution for the installation of:

- a) Domestic solid fuel burning appliances, installed in either domestic or commercial situations, and
- b) Flue systems.

A normative Appendix is an integral part of this Standard.

**7.1.2 Modifications to AS/NZS 2918**

Delete paragraph 3.8 and substitute the following:

“3.8 Seismic restraint

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

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

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

Delete Section 7 and substitute the following:

“7.1 Ventilation

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

7.2 Water heating equipment

Water heating appliances installed in conjunction with the heating appliance shall be vented and shall comply with Acceptable Solution G12/AS1.”
7.2 Gas-burning appliances

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.

7.2.2 Modifications to AS/NZS 5601.1
Delete paragraph 6.2.11 and substitute the following:

“6.2.11 Seismic restraint
Seismic restraint of appliances installed in buildings shall be designed in accordance with B1/VM1 Paragraphs 2.0 and 13.0.”

Add a Note to 6.4 as follows:

“Ventilation requirements are contained in Acceptable Solution G4/AS1. The ventilation requirements of this Standard may exceed the performance requirements of NZBC G4.”

7.3 Oil-fired appliances

7.3.1 AS 1691, with the modifications given in Paragraph 7.3.2, is an Acceptable Solution for the installation of domestic oil-fired appliances.

7.3.2 Modifications to AS 1691
Delete paragraph 2.2.3 and substitute the following:

“2.2.3 Electrical equipment
Electrical equipment shall comply with Acceptable Solution G9/AS1 or Verification Method G9/VM1.”

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

Delete the Note to paragraph 3.1.2 (d).
Delete paragraph 3.1.4 and substitute the following:

“3.1.4 Stability
The appliance shall be mechanically fixed to the building.
The test seismic force on the fuel tank shall be taken as the application of a horizontal force in kilograms numerically equal to 0.40 times the tank volume in litres acting at the centre of the tank.
The test seismic force on the appliance shall be taken as the application of a horizontal force equal to 0.40 times the appliance operating weight acting at the centre of the appliance.
The appliance and the fuel tank shall resist their respective seismic forces with no significant movement.”

Delete the words “without specific approval” from paragraph 3.2.8 (b).
Delete paragraph 5.1.1.
Add Note to 5.2.2:

“Note: Refer to Acceptable Solution G4/AS1 for ventilation requirements.”

7.3.3 AS/NZS 2918 Sections 2 and 4 are also Acceptable Solutions for the installation of flues for domestic oil-fired appliances.

7.4 Downlights

7.4.1 Recessed luminaires shall be one of the following types, as specified in AS/NZS 60598.2.2:

a) IC-F, or
b) IC, or
c) CA-80 or
d) CA-135.

Full compliance can only be achieved if the installation of the luminaire is in accordance with AS/NZS 60598.2.2.

Comment:
There is a requirement for a clearance of 100 mm from recessed luminaires to insulation materials when installing insulation in existing buildings where the type of luminaire is undefined.
7.5 Open fires

Chimneys

7.5.1 Chimneys shall be constructed in accordance with Table 7.1 and Figure 7.1. They shall have:

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

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

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

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

<table>
<thead>
<tr>
<th>Chimney construction</th>
<th>Chimney jamb and chimney back thickness</th>
<th>Chimney breasts and side gathering, and chimney wall thickness above the level of the gather, excluding linings (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excluding filling and flue liner (mm)</td>
<td>Including filling and flue liner (mm)</td>
</tr>
<tr>
<td>Concrete</td>
<td>170</td>
<td>255</td>
</tr>
<tr>
<td>Brickwork</td>
<td>155</td>
<td>230</td>
</tr>
<tr>
<td>Precast pumice concrete</td>
<td>85</td>
<td>170</td>
</tr>
</tbody>
</table>

7.5.2 Cross-sectional areas of flues shall be no less than 0.03 m² for an open fireplace (see Figure 7.2).
Figure 7.1 Chimney terms and dimensions
Paragraph 7.5

Acceptable Solution C/AS1
7.5.3 Flue linings shall be one of the following types:

a) Clay flue liners with rebated or socketed joints

b) Imperforate clay pipes with socketed joints

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

The linings shall be fitted with the sockets or rebates uppermost to prevent condensate running out, and to prevent any caulking material from being adversely affected. Joints between the liners, and any space between liners and the masonry, shall be filled with weak mortar or insulating concrete (see Figure 7.2 (a)).

7.5.4 Flue liners are not required for:

a) Brick chimneys if constructed of two 90 mm skins of brickwork with a 65 mm grout-filled gap between (see Figure 7.2 b))

b) Ordinary concrete chimneys

c) Precast pumice concrete chimneys.

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

7.5.6 Every fireplace shall have a separate flue.

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

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


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

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

7.5.12 AS/NZS 2918 Sections 2 and 4 are also Acceptable Solutions for the installation of flues from open fires.
Figure 7.2  Brick chimney flues – sections
Paragraphs 7.5.2, 7.5.3 and 7.5.4

(a) With flue liner

(b) Without flue liner

- Grout
- Flue wall thickness 155 mm minimum.
- Area of the flue 0.03 m² for open fireplaces. For solid fuel burning appliances see AS/NZS 2918

- Flue liner
- Double skin brickwork
- Wall thickness each skin to be 90 mm minimum
- Grout
- Flue
Figure 7.3 Clearances between a chimney and hearth, and combustible materials

Paragraph 7.5.9

Chimney flue liner built of non-combustible material

No combustible material to be within 50 mm of any outer face of a chimney

No combustible material to be within:
(a) 200 mm of a fireplace opening,
(b) 200 mm of the upper surface of the hearth, and
(c) 75 mm from the lower surface of the hearth.

Hearth edges are to be separated from combustible material with insulating board (see Paragraph 9.3.2)

Hearth clearance, see section below

Section showing minimum dimensions

It is essential to provide a ventilated space of no less than 75 mm even if the hearth thickness is greater than 125 mm

75 mm minimum

200 mm minimum

Ventilated space

Combustible material
Appendix A (normative): Fire safety precautions

A1.1 Fire alarm and sprinkler systems

A1.1.1 Fire alarm systems used in fire safety systems shall satisfy the requirements of Acceptable Solution F7/AS1. Fire sprinkler systems used in the fire safety systems shall, except where specified, also satisfy the requirements of Appendix B.

A1.2 Requirements common to alarm systems

A1.2.1 Except for domestic smoke alarm systems and, where otherwise specified, each fire alarm system, regardless of method of activation, shall be provided with a means of communication with the Fire Service in accordance with Acceptable Solution F7/AS1.

A2.1 Fire safety system descriptions

A2.1.1 The following text provides a brief description of fire safety systems not otherwise described in Acceptable Solution F7/AS1. See F7/AS1 for descriptions of fire alarm systems Types 1, 2, 3, 4, 5, 6 and 7.

Type 9 – Smoke control in air handling systems

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

a) AS/NZS 1668: Part 1 and interface with any Type 4 or 7 system installed if it is self contained detection, control and provision of output signal/alarm, or

b) NZS 4512 to provide ancillary function output for control of the HVAC system if a Type 4 or 7 alarm system is used as a means of smoke detection.

Type 18 – Fire hydrant systems for buildings

Fire hydrant systems shall comply with NZS 4510.
Appendix B (normative): Fire sprinkler systems

B1.1 Introduction

B1.1.1 Wherever sprinklers are required by this Acceptable Solution, they shall comply with the relevant New Zealand Standard, amended as shown in Paragraphs B2.1 and B3.1.

B2.1 Automatic fire sprinkler systems

B2.1.1 NZS 4541 is amended as follows:

Clause 103 Definitions

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

Clause 205 Delete entire clause.
Clause 209 Delete entire clause.

Clause 1203 Routine Surveys

Clause 1203.1 Delete first two paragraphs and replace with:

“It is important that a sprinkler system at all times complies with this Standard as amended by Paragraph B2.1 of Appendix B to C/AS1 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person.”

B3.1 Residential fire sprinkler systems

B3.1.1 NZS 4515 is amended as follows:

Clause 1.5 Definitions

Sprinkler system A system including:
(a) to (g) No change.
(h) Delete.
Clause 1.11 Delete entire clause.
Clause 2.1.2 Delete.
Clause 2.1.3 Delete.
Appendix C (normative):
Test methods

C1.1 General
This Appendix contains test methods for confirming that specific building elements satisfy relevant provisions of the Acceptable Solutions for Protection from Fire. It includes both established standard tests and other test methods for building elements in situations where standard tests are unavailable.

Comment:
Regardless of the year of the Standard incorporated by reference in this Acceptable Solution, there is no intention to require the building elements listed here to be retested to the current edition of the relevant Standard when they have previously been tested to an earlier version of that Standard in force at the time of testing.

C2.1 Flammability of floor coverings
Materials shall be assigned a critical radiant flux when tested to:
ISO 9239 Reaction to fire tests for flooring – Part 1: Determination of the burning behaviour using a radiant heat source.
Or in lieu of testing refer to Table B1 of Appendix B of C/VM2.

C3.1 Flammability of suspended flexible fabrics and membrane structures
Materials shall be assigned a flammability index when tested to:
AS 1530 Methods for fire tests on building materials and structures – Part 2: Test for flammability of materials.

C4.1 Properties of lining materials
C4.1.1 Combustibility test
Materials shall be classified as non-combustible or combustible when tested to:

C4.1.2 Materials for internal surface linings shall be given a Group Number in accordance with Appendix A of C/VM2 and tested to either:
ISO 5660 Reaction-to-fire tests
Part 1 Heat release rate (cone calorimeter method), and
Part 2 Smoke production rate (dynamic method), or
ISO 9705 Fire tests – Full scale room test for surface products.
Or in lieu of testing refer to Table A1 of Appendix A of C/VM2.

C5.1 Fire resistance
C5.1.1 Primary and secondary elements, closures and fire stops shall be assigned a fire resistance rating (FRR) when tested to:
a) AS 1530 Methods for fire tests on building materials and structures – Part 4: Fire resistance tests of elements of building construction, or
b) NZS/BS 476 Fire tests on building materials and structures – Parts 21 and 22.

C5.1.2 Fire stops shall be tested:
a) In circumstances representative of their use in service, paying due regard to the size of expected gaps to be fire stopped, and the nature of the fire separation within which they are to be used, and
b) In accordance with AS 4072: Components for the protection of openings in fire-resistant separating elements – Part 1: Service penetrations and control joints.
C6.1 Fire doors and smoke control doors

C6.1.1 Fire doors shall be evaluated in circumstances representative of their use in service, and shall comply with NZS 4520 Fire-resistant doorsets.

Smoke control doors

C6.1.2 A door shall be deemed to be a smoke control door if, in addition to the requirements in this Acceptable Solution for smoke control doors:

a) The door is a fire door that is fitted with appropriate smoke seals, or if:

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

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

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

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

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

   i) Leaf to frame 3 mm

   ii) Leaf to leaf 5 mm

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

   g) Any additional facings shall be adhesive fixed, and

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

Frictional forces

C6.1.3 The forces required to open any fire door or smoke control door on an escape route shall not exceed 67 N to release the latch, 133 N to set the door in motion, and 67 N to open the door to the minimum required width. These forces shall be applied at the latch stile. These requirements do not apply to horizontal sliding doors in risk group SI or to power-operated doors.

Self-closing provision

C6.1.4 All fire and smoke control door leaves shall be self-closing, and provision shall be made for the self-closing device to be adjustable during commissioning to satisfy the requirements of Paragraph C6.1.3 after installation.

C6.1.5 Where it is desirable in normal circumstances for a fire door or smoke control door to operate freely, it is acceptable to use a self-closer mechanism which activates in the event of fire but does not operate at other times.

Comment:
1. These circumstances can occur where people are under care. Leaving the door to the occupant’s room (or suite) open reduces that occupant’s feeling of isolation and permits ready observation by staff.

2. Self-closers can be an obstruction to the elderly and people with disabilities, who may have difficulty in opening the door against the pressure applied by the self-closer. Acceptable Solution C/AS3 Paragraph 4.6 describes situations where smoke control doors do not have to be self closing where they are used within a group sleeping area or suite.

Automatic smoke-sensing devices

C6.1.6 Automatic smoke-sensing devices complying with NZS 4512, if used, shall be positioned within the stream of air that passes the door when the smoke control door is fully open.
C7.1 Fire properties of external wall cladding systems

C7.1.1 Fire properties of external wall cladding systems shall be determined in accordance with:


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:

a) An applied external heat flux of 50 kW/m², and
b) A test duration of 15 minutes, and
c) The total heat release measured from start of the test, and
d) Sample orientation horizontal, and
e) Ignition initiated by the external spark igniter.

C7.1.3 Timber claddings which have a fire retardant treatment incorporated in or applied to them shall be subjected to the regime of accelerated weathering described in ASTM D 2898 Method B with the water flow rate from Method A before testing in accordance with the requirements of Paragraph C7.1.1.

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.

Comment:
The non-combustible classification represents a more onerous performance level than those required by Paragraph 5.8.1 and is therefore acceptable. A non-combustible classification may be claimed only if the respective materials have been subjected to testing as described in Paragraph C7.1.1.

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.

Comment:
Aluminium has a melting point of less than 750°C.
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