



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI

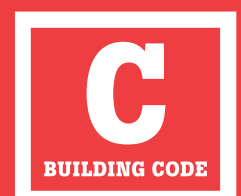
C/VM1

**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

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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.

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New Zealand Government

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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.

Document History		
	Date	Alterations
New document	Effective from 10 April 2012	C/VM1 and C/AS1 are a new publication that can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire.
Amendment 1 (Errata 1)	Effective from 15 February 2013 until 18 June 2014	p. 5 Contents pp. 7–8 References p. 15 C/VM1 1.1.1 p. 17 C/AS1 Table 1.1 p. 19 C/AS1 1.3 pp. 25–26 C/AS1 5.1, 5.3.1, 5.3.2, 5.4, 5.5 p. 37 C/AS1 C4.1.2 and C5.1.1 p. 40 Index
Amendment 2	Effective from 19 December 2013 until 28 February 2015	p. 5 Contents p. 7 References p. 12 Definitions p. 17 C/AS1 1.1.1, Table 1.1 p. 18 C/AS1 Figure 1.1 p. 19 C/AS1 1.3 p. 21 C/AS1 Table 2.1 p. 22 C/AS1 3.4, Table 3.2 pp. 23–24 C/AS1 4.2, 4.3 pp. 25–26 C/AS1 5.1, 5.3.1, Table 5.1 p. 27 C/AS1 6.1 p. 29 C/AS1 7.2 p. 36 B2.1.1 p. 38 C6.1.2 p. 40 Index
Amendment 3	Effective from 1 July 2014 to 30 May 2017	p. 5 Contents pp. 7–8 References pp. 9 and 12 Definitions p. 17 C/AS1 1.1.1, Table 1.1 p. 19 C/AS1 1.3 p. 20 C/AS1 2.2.1 p. 22 C/AS1 Table 3.2 pp. 23–24 C/AS1 4.2, 4.3 pp. 25–26 C/AS1 5.1, 5.3, Figure 5.1, Table 5.1 p. 27 C/AS1 6.1 p. 29 C/AS1 7.4 p. 37 C1.1, C2.1, C4.1.2, C5.1.1 p. 40 Index
Amendment 4	Effective 1 January 2017	p. 7 References p. 21 2.3.1 p. 22 C/AS1 Table 3.2 p. 25 C/AS1 5.1.2

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Amends
2 and 3

Errata 1
Feb 2013

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.

		Where quoted		
Standards New Zealand				
	NZS/BS 476:- Part 21: 1987	Fire tests on building materials and structures Methods for determination of the fire resistance of loadbearing elements of construction	AS1 C5.1.1	
	Part 22: 1987	Methods for determination of the fire resistance of non-loadbearing elements of construction	AS1 C5.1.1	
	AS/NZS 1668:- Part 1: 1998	The use of ventilation and air conditioning in buildings Fire and smoke control in multi-compartment buildings <i>Amend: 1</i>	VM1 1.1.1 AS1 A2.1.1	
Errata 1 Feb 2013	AS/NZS 2918: 2001	Domestic solid fuel burning appliances – installation	AS1 7.1.1, 7.1.2, 7.3.3 7.5.5, 7.5.10 Comment, Figure 7.2	
	NZS 4510: 2008	Fire hydrant systems for buildings <i>Amend: 1</i>	AS1 A2.1.1	
	NZS 4512: 2010	Fire detection and alarm systems in buildings	AS1 Table 2.1, Table 3.2, A2.1.1, C6.1.6	
Amend 4 Jan 2017	NZS 4514:2009	Interconnected Smoke Alarms for houses	AS1 Table 3.2	
	NZS 4515: 2009	Fire sprinkler systems for life safety in occupancies of less than 2000 m ²	AS1 6.1.1, Table 2.1, Table 3.2, Table 5.1, B3.1.1	Amends 2 and 3
	NZS 4517: 2010	Fire sprinkler systems for houses	AS1 Table 3.2	
	NZS 4520: 2010	Fire resistant doorsets	AS1 C6.1.1	
	NZS 4541: 2013	Automatic fire sprinkler systems	Definitions, B2.1.1	
	AS/NZS 5601:- Part 1: 2010	Gas installation General installations <i>Amend: 1</i>	AS1 7.2.1, 7.2.2	
Amend 2 Dec 2013	AS/NZS 60598: 2001	Luminaires Part 2.2 Particular requirements – Recessed luminaires <i>Amend: AA</i>	AS1 7.4.1	

Standards Australia

AS 1366:-	Rigid cellular plastics sheets for thermal insulation
Part 1: 1992	Rigid cellular polyurethane (RC/PUR) <i>Amend: 1</i>
Part 2: 1992	Rigid cellular polyisocyanurate (RC/PIR)
Part 3: 1992	Rigid cellular polystyrene – moulded (RC/PS-M) <i>Amend: 1</i>
Part 4: 1989	Rigid cellular polystyrene – extruded (RC/PS-E)
AS 1530:-	Methods for fire tests on building materials, components and structures
Part 1: 1994	Combustibility test for materials AS1 C4.1.1
Part 2: 1993	Test for flammability of materials
Part 4: 2005	Fire-resistance tests of elements of building construction
AS 1691: 1985	Domestic oil-fired appliances – installation
AS 4072:-	Components for the protection of openings in fire-resistant separating elements
Part 1: 2005	Service penetrations and control joints <i>Amend: 1</i>

Errata 1
Feb 2013**European Standards**Errata 1
Feb 2013**International Standards Organisation**

ISO 5660:-	Reaction-to-fire tests – Heat release, smoke production and mass loss rate
Part 1: 2002	Heat release rate (cone calorimeter method)
Part 2: 2002	Smoke production rate (dynamic measurement)
ISO 9239:-	Reaction to fire tests for flooring
Part 1: 2010	Determination of the burning behaviour using a radiant heat source.
ISO 9705: 1993	Fire tests – Full scale room test for surface products

Errata 1
Feb 2013**New Zealand Legislation**

Hazardous Substances and New Organisms Act 1996

Where quoted

AS1 4.3	
AS1 4.3	
AS1 4.3	
AS1 4.3	
Definitions,	
AS1 C3.1	
AS1 C5.1.1	
AS1 7.3.1, 7.3.2	
AS1 C5.1.2	

Amend 3
Jul 2014

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.

Comment:

Notwithstanding the definition of *building*, a number of separated *buildings* cannot be taken as a single *firecell* for the purposes of this Acceptable Solution.

Building Act 2004 (the Building Act)

means the principal legislation dealing with building controls in New Zealand.

Comment:

The *Building Act* applies to the construction, alteration, and demolition of new and existing buildings throughout 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 jambs 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.

Comment:

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*.

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*.

Comment:

Doors are not obstructions in an escape route provided they comply with C/AS1–C/AS7 and D1/AS1.

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*.

Comment:

A roof is an *external wall* if within 30° of the vertical.

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.

Comment:

Floors, in this context, includes ground floors, and those in which the underside is exposed to the external environment (eg, when cantilevered). Note also that internal floors between *firecells* are *fire separations*.

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

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.

Comment:

Examples of FRRs are:

- a) 60/60/30 indicating *structural adequacy* 60 minutes, *integrity* 60 minutes, *insulation* 30 minutes.
- b) 30/-/- indicating *structural adequacy* 30 minutes, but no time requirement for *integrity* or *insulation*.
- c) 60/30/x indicating *structural adequacy* of 60 minutes, *integrity* of 30 minutes, and a requirement for *insulation*.

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*.

Comment:

Fire stops are mainly used to seal around *penetrations*, but can also be used to seal narrow gaps between *building elements*.

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

Flue The passage through which the products of combustion are conveyed to the outside.

Flue liner Pipes or linings of *fire clay*, metal or *fire brick* that surrounds *flues*.

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

Foamed plastics *Combustible* foamed plastic polymeric materials of low density (typically less than 100 kg/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.

Amend 2
Dec 2013

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.

Amend 3
Jul 2014

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.

Amend 3
Jul 2014

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.

Amend 2
Dec 2013

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* to which the lessee or licensee of the *building* in question has an exclusive right of access and occupation or to which 2 or more occupiers of the *building* in question have rights of access and occupation, the *relevant boundary* is the *boundary* on the far side of that other *property*; or
- (c) a *boundary* shown on a unit plan (but excluding a *boundary* between a principal unit and its accessory unit), except that if the *other property* is open space and is common property, the *relevant boundary* is the *boundary* on the far side of that *other property*.

Comment:

1. Where an easement, such as a right of way, occurs within an *allotment*, the *relevant boundary* shall remain the same as if the easement did not exist.
2. *Boundaries* within a cross-lease or company lease or licence are shown on a survey plan. In some cases the *boundary* is the *external wall* or roof of a *building*.
3. The unit title *boundaries* of principal units, accessory units, and common property are shown in the unit plan. A *boundary* is frequently an internal or *external wall*, an upper floor, or the roof of a *building*.
4. A wall along a *boundary* between two *allotments* is called a "party wall" when the *owners* of the *allotments* each have legal rights in respect of that wall registered by way of easements on one or both titles. An internal wall between cross-leases, company leases, or unit titles, or between one of them and common property, is not generally called a party wall but in that case also the lessees, unit title holders, or corporate body concerned each have legal rights in respect of that wall. Such a wall separates areas which are *other property* in relation to each other, but the wall itself is part of each property. The *fire* protection consequence of that legal concept is that such a wall can be regarded as a *fire separation* providing protection against horizontal *fire* spread in each direction. In other words, that wall may provide the appropriate *FRR* instead of each property having its own wall of that *FRR*.

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 S1.

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 a *FRR*, intended to avoid premature failure due to structural collapse as a result of applied load, dead and live loads or as a result of any additional loads caused by *fire*

Standard test A test method which is recognised as being appropriate for the *fire* protection properties being assessed.

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*.

Verification Method C/VM1

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.

Errata 1
Feb 2013

Acceptable Solution C/AS1

Part 1: General

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- 1.1 Introduction and scope
- 1.2 Using this Acceptable Solution
- 1.3 Alterations and changes of use to buildings

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		
	Acceptable Solution	Risk group	Applies to	
Amends 2 and 3	C/AS1	Buildings with sleeping (residential) and outbuildings	SH	Houses, townhouses and small <i>multi-unit dwellings</i> Outbuildings
Amend 3 Jul 2014	C/AS2	Sleeping (non institutional)	SM	Permanent accommodation eg, apartments Transient accommodation eg, hotels, motels, hostels, backpackers, refuge shelters Education accommodation
Amend 3 Jul 2014	C/AS3	Care or detention	SI	Institutions, hospitals (excluding special care facilities), residential care, rest homes, care in the community houses and homes, medical day treatment (using sedation), detention facilities (excluding prisons)
	C/AS4	Public access and educational facilities	CA	Crowds, halls, recreation centres, public libraries (<2.4 m storage height), cinemas, shops, personal services (eg, dentists and doctors except as included above, beautician and hairdressing salons), schools, restaurants and cafes, <i>early childhood centres</i>
Errata 1 Feb 2013	C/AS5	Business, commercial and low level storage	WB	Offices (including professional services such as law and accountancy practices), laboratories, workshops, manufacturing (excluding <i>foamed plastics</i>), factories, processing, temperature controlled storage (capable of <3.0 m storage height other than some limited areas in processing areas) and other storage <i>buildings</i> capable of <5.0 m storage height (except some limited areas <8.0 m to the apex), light aircraft hangars
Amend 3 Jul 2014	C/AS6	High level storage and other high risks	WS	Warehouses (capable of ≥5.0 m storage height other than some limited areas, see C/AS5), temperature controlled storage (capable of ≥3.0 m storage height other than some limited areas, see C/AS5), trading and bulk retail (≥3.0 m storage height)
	C/AS7	Vehicle storage and parking	VP	Vehicle parking – within a <i>building</i> or a separate <i>building</i>

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)

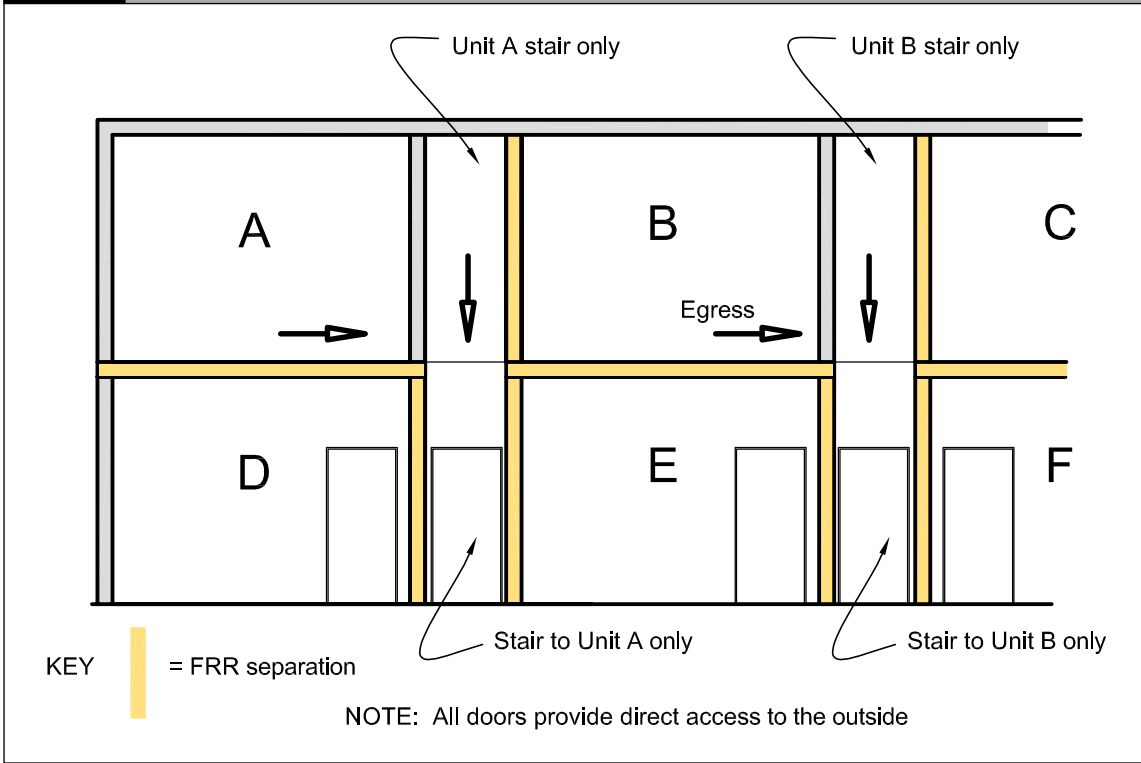
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Figure 1.1 Multi-unit dwellings in risk group SH
Paragraph 1.1.1



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- 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.

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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 has different activities/uses 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

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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.

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

CONTENTS

- 2.1 Provision of firecells
- 2.2 Fire safety systems
- 2.3 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.

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Table 2.1 Fire safety systems specified in this Acceptable Solution		
Type of system	System description	Relevant Standards for installation
1	Domestic smoke alarm	Acceptable Solution F7/AS1
4	Smoke detection and alarm system with manual call points	NZS 4512
5	Enhanced smoke detection and alarm system with manual call points	NZS 4512
6	Automatic fire sprinkler system	NZS 4515
7	Automatic fire sprinkler system with smoke detection and alarm system	NZS 4515, NZS 4512

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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.

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Jan 2017

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

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.

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Table 3.2 Travel distances on escape routes					
	Type 1 system only	NZS 4514 Interconnected Smoke Alarms	NZS 4517 Sprinkler system with Type 1 (in single household units only)	NZS 4515 Sprinkler system with Type 1	NZS 4515 Sprinkler system and NZS 4512 Smoke detection system
<i>Dead end open path</i>	25 m	35 m	35 m	40 m	50 m
<i>Total open path</i>	60 m	75 m	75 m	90 m	120 m
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.					

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Part 4: Control of internal fire and smoke spread

CONTENTS

- 4.1 Fire separations**
- 4.2 Surface finishes**
- 4.3 Foamed plastics or combustible insulating materials**

Amends
2 and 3

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*.

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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*:

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- 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

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

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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.

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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

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*.

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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 90° 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

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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.

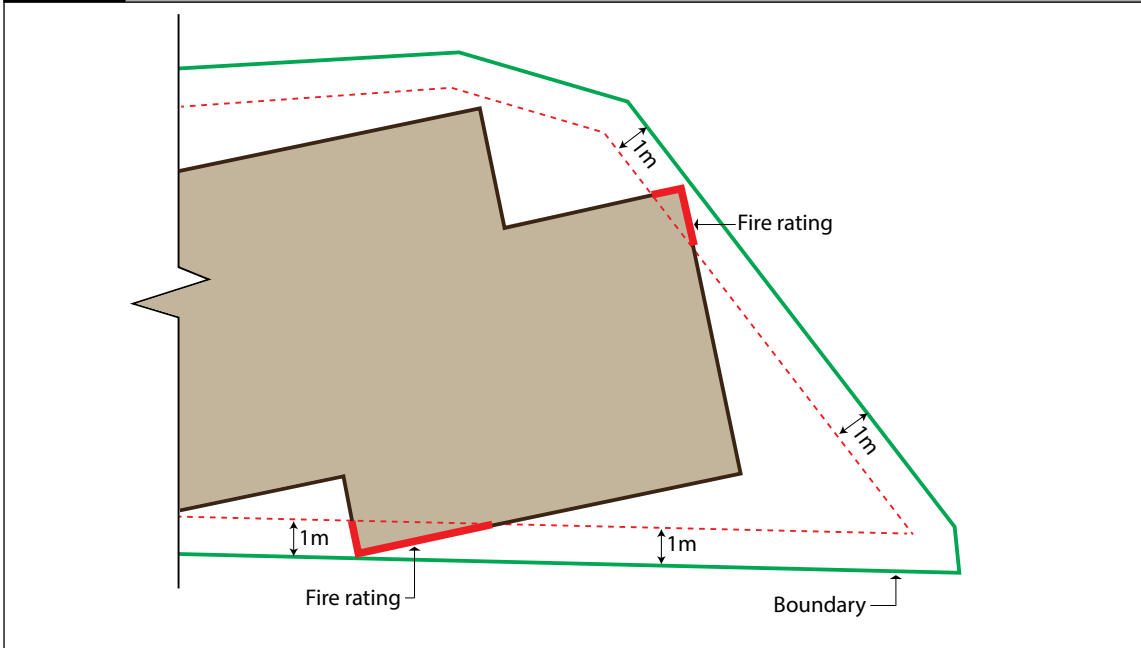
5.3.2 *Fire* rating of the roof is not required if the *household unit* is protected with a sprinkler system complying with NZS 4515.

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Figure 5.1 Fire rating of external walls
Paragraph 5.1



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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.

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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 than 40 m², no part of the roof is closer than 0.3 m to a *relevant boundary*.

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Table 5.1 Requirements for external wall claddings

Column A	Column B	Column C	Column D	
	Distance to <i>relevant boundary</i> (angle between wall and boundary is less than 90°)			
	Less than 1.0 m	Distance greater than or equal to 1.0 m and <i>building height</i> less than or equal to 10 m	Distance greater than or equal to 1.0 m and <i>building height</i> greater than 10 m	
			Unsprinklered	Sprinklered to NZS 4515
Peak heat release rate (kW/m ²)	100	No requirement	150	No requirement
Total heat released (MJ/m ²)	25	No requirement	50	No requirement

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.

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Part 6: Firefighting

CONTENTS

6.1 Fire service vehicular access

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*.

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Part 7: Prevention of fire occurring

CONTENTS

- 7.1 Solid fuel appliances
- 7.2 Gas-burning appliances
- 7.3 Oil-fired appliances
- 7.4 Downlights
- 7.5 Open fires

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.”

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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.

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7.5 Open fires

Chimneys

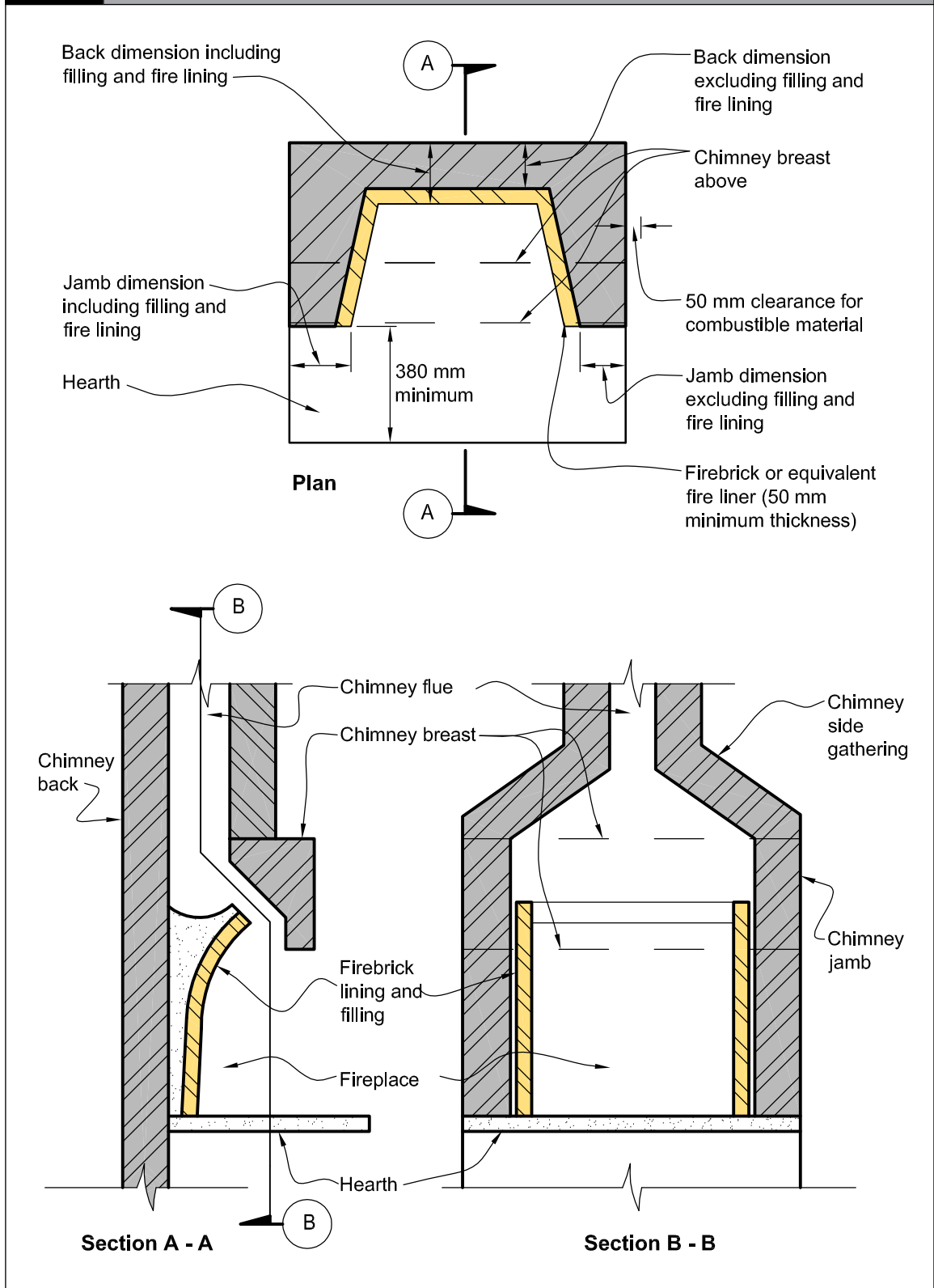
7.5.1 *Chimneys* shall be *constructed* in accordance with Table 7.1 and Figure 7.1. They shall have:

- 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 7.1 Minimum acceptable dimensions of chimneys			
<i>Chimney construction</i>	<i>Chimney jamb and chimney back thickness</i>		<i>Chimney breasts and side gathering, and chimney wall thickness above the level of the gather, excluding linings (mm)</i>
	Excluding filling and <i>flue liner</i> (mm)	Including filling and <i>flue liner</i> (mm)	
Concrete	170	255	170
Brickwork	155	230	155
Precast pumice concrete	85	170	85

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



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 *Hearths* for *fireplaces* shall:

- a) Be *constructed* of fully grouted stones, bricks or concrete of no less than 50 mm total thickness
- b) Extend no less than 230 mm on each side of the *fireplace* opening, and no less than 380 mm forward of the *fireplace* opening, and
- c) Have no *combustible* material closer than the clearances given in Paragraph 7.5.8 b) from the upper and lower surfaces of the *hearth*.

7.5.9 Clearances between a *chimney* and any *combustible* material (see Figure 7.3) shall be no less than:

- a) 200 mm at any opening in the *flue*, or at the *fireplace* opening, and
- b) 200 mm above or below the upper surface of the *hearth*, and 75 mm from the lower surface of the *hearth*.

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

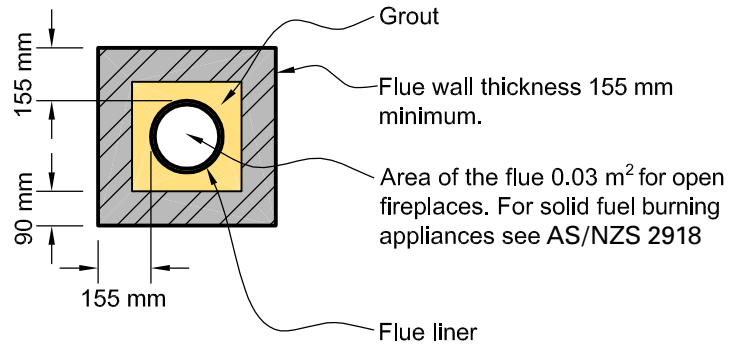
Comment:

AS/NZS 2918 Appendix C gives a test method for heat-resistant and heat-tolerant materials.

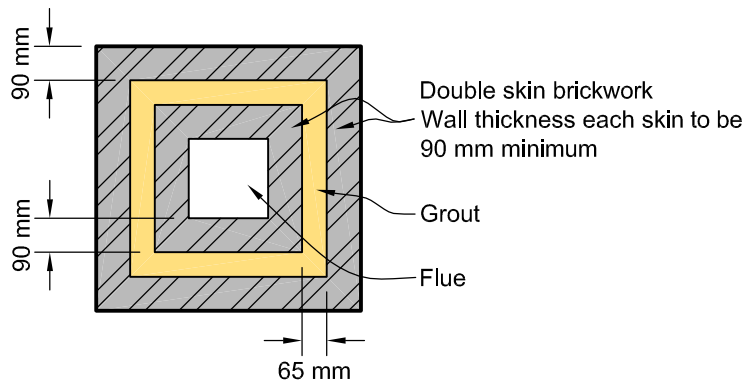
7.5.11 A ventilated space of no less than 50 mm shall be provided between the outer face of a *fireplace*, *chimney* or *flue* and any *combustible* material.

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

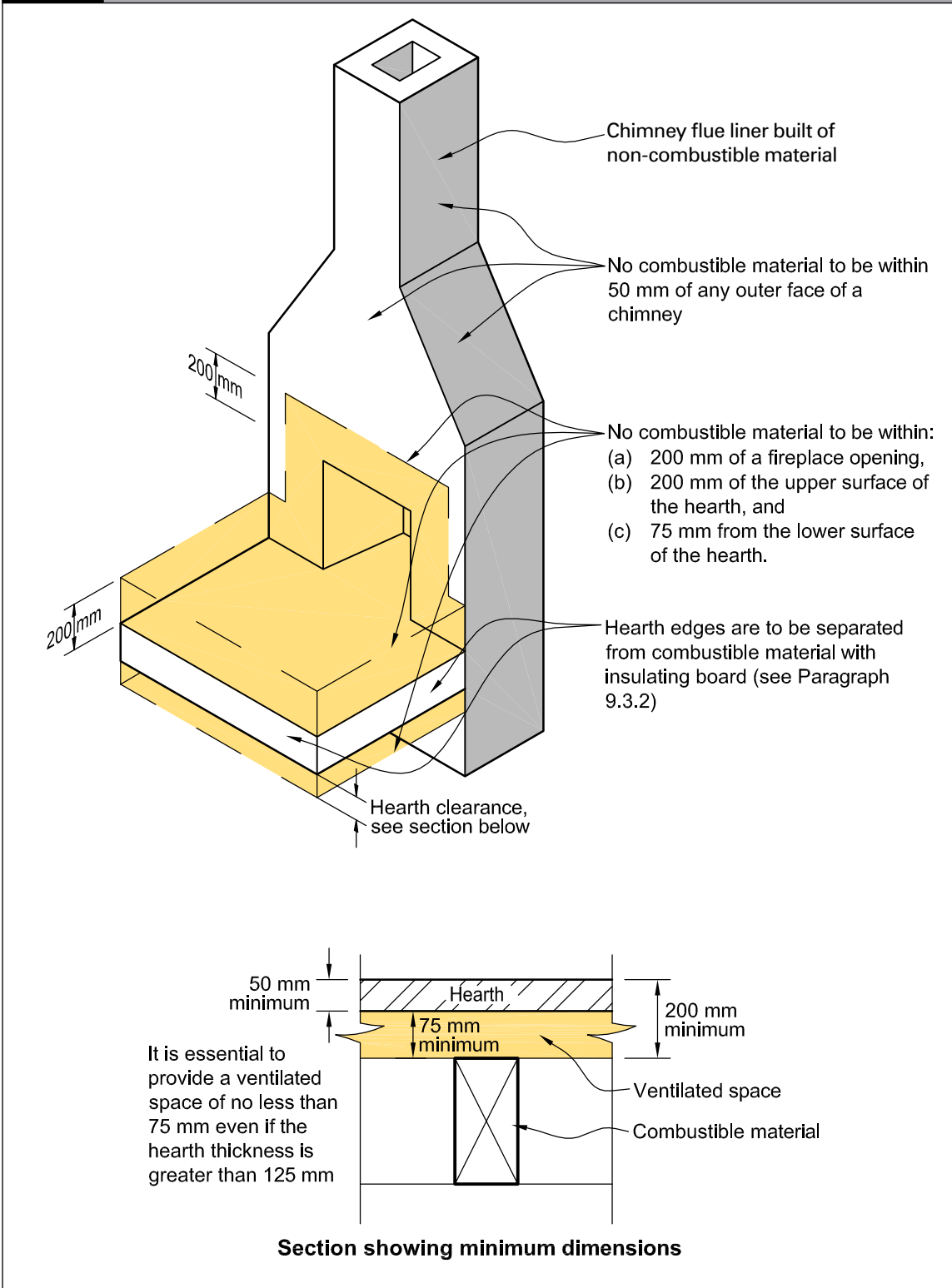


(a) With flue liner



(b) Without flue liner

Figure 7.3 Clearances between a chimney and hearth, and combustible materials
Paragraph 7.5.9



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

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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.

Amend 2
Dec 2013

Amend 2
Dec 2013

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.

Amend 3
Jul 2014

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.

Amend 3
Jul 2014

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:

AS 1530 Methods for fire tests on building materials and structures – Part 1: Combustibility test for materials.

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.

Errata 1
Feb 2013

Amend 3
Jul 2014

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.

Errata 1
Feb 2013

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.

Amend 2
Dec 2013

Amend 2
Dec 2013

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:

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

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.

Index C/VM1 and C/AS1

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