



Ministry of Business, Innovation & Employment

Dear Customer

Please find attached the December 2013 amendment to C/AS1 Acceptable Solution for Buildings with Sleeping (residential) and Limited Area Outbuildings (Risk Group SH), published by the Ministry of Business, Innovation and Employment. The Ministry of Business, Innovation and Employment combines the former Department of Building and Housing, Department of Labour, Ministry of Economic Development and Ministry of Science and Innovation.

To update your printed copy of C/VM1 and C/AS1, please make the following changes:

Section	Previous version	December 2013 amendment
C/VM1 Verification Method for Solid Fuel Appliances and C/AS1 Acceptable Solution for Buildings with Sleeping (residential) and Limited Area Outbuildings (Risk Group SH)		
Title pages	Remove title page and document history/status	Replace with new title page and document history/status
Contents	Remove pages 5/6	Replace with new pages 5/6
References	Remove pages 7/8	Replace with new pages 7/8
Definitions	Remove pages 11/12	Replace with new pages 11/12
C/AS1 Part 1	Remove pages 17–20	Replace with new pages 17–20
C/AS1 Parts 2 and 3	Remove pages 21/22	Replace with new pages 21/22
C/AS1 Part 4	Remove pages 23/24	Replace with new pages 23/24
C/AS1 Part 5	Remove pages 25/26	Replace with new pages 25/26
C/AS1 Part 6	Remove pages 27/28	Replace with new pages 27/28
C/AS1 Part 7	Remove pages 29/30	Replace with new pages 29/30
Appendices	Remove pages 35–38	Replace with new pages 35-38
Index	Remove pages 39/40	Replace with new pages 39/40



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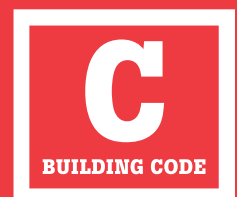
C/VM1

**Verification Method for Solid Fuel
Appliances**

C/AS1

**Acceptable Solution for Buildings with
Sleeping (residential) and Limited Area
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.

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**Acceptable Solutions and Verification Methods are available
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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 Verification Method C/VM1 and Acceptable Solution C/AS1 are effective from 19 December 2013. 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 19 December 2013.

The previous versions, Amendment 1 (Errata 1), of this Verification Method and Acceptable Solution can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire until 18 June 2014. They can be used for building consent applications submitted before 19 June 2014.

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	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

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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.

		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
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
NZS 4515: 2009	Fire sprinkler systems for life safety in occupancies of less than 2000 m ²	AS1 Table 2.1, Table 3.2, Table 5.1, B3.1.1
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
AS/NZS 60598: 2001	Luminaires Part 2.2 Particular requirements – Recessed luminaires <i>Amend: AA</i>	AS1 7.4.1

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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>

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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
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Hazardous Substances and New Organisms Act 1996

Where quoted

AS1 4.2.2
AS1 4.2.2
AS1 4.2.2
AS1 4.2.2
Definitions,
AS1 C3.1
AS1 C5.1.1
AS1 7.3.1, 7.3.2
AS1 C5.1.2
AS1 C4.1.2, C7.1.1, C7.1.2
Definitions, AS1 C4.1.2
AS1 C2.1
AS1 C4.1.2
AS1 1.1.5

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.

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.

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) 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.

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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—

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Table 1.1 Risk groups and Acceptable Solutions			
	Acceptable Solution	Risk group	Applies to
C/AS1	Single <i>household units</i> and small <i>multi-unit dwellings</i>	SH	Houses, townhouses and small <i>multi-unit dwellings</i> Limited area outbuildings
C/AS2	Sleeping (non institutional)	SM	Permanent accommodation eg, apartments Transient accommodation eg, hotels, motels, hostels, backpackers Education accommodation
C/AS3	Care or detention	SI	Institutions, hospitals (excluding special care facilities), residential care, resthomes, 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>
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, cool stores (capable of <3.0 m storage height) and warehouses and other storage units capable of <5.0 m storage height, light aircraft hangars
C/AS6	High level storage and other high risks	WS	Warehouses (capable of ≥5.0 m storage height), cool stores (capable of ≥3.0 m storage height), 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:

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*.

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 8.0 of NZBC up to a maximum floor area of 100 m²).

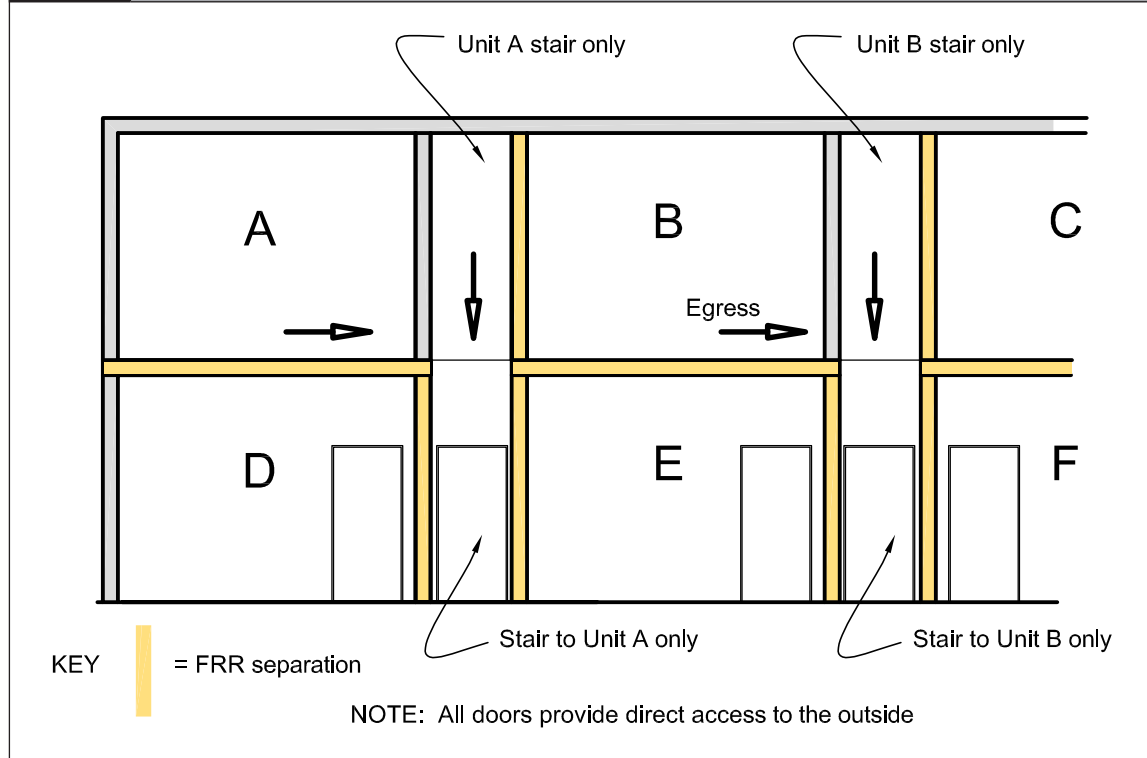
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This includes the following:

- 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.



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



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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 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

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 being used for an assessment of an existing *building* that is being *altered* Parts 1, 2, 3 and 4 of this Acceptable Solution shall be considered to the extent necessary for compliance with the *Building Act* s112.

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The *building work* itself shall comply fully with this Acceptable Solution.

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If this Acceptable Solution is being used where an existing *building* is undergoing a change of use, Parts 1, 2, 3, 4 and 5 of this Acceptable Solution shall be considered to the extent necessary for compliance with the *Building Act*.

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Where compliance with the requirements of the *Building Act* for alterations and changes of use is not fully demonstrated through using this Acceptable Solution, the level of the assessment required shall be agreed with the *building consent authority* or *territorial authority*.

Comment:

The extent of assessment should be consistent with a number of risk factors including:

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

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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* 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.

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. This applies to *fire* rating requirements in Part 3: Means of escape and Part 4: Control of internal fire and smoke spread.

Property rating = 30 minutes. This applies to *fire* rating requirements in Part 5: External spread of fire.

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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	Type 1 system only	NZS 4512 Smoke detection system	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.

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Part 4: Control of internal fire and smoke spread

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CONTENTS

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

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 exposed *combustible insulating materials* are used, there are no *surface finish* requirements in *risk group SH*.

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4.3 Foamed plastics or exposed combustible insulating materials

Where *foamed plastics* or exposed *combustible insulating materials* form part of a wall, ceiling or roof 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. 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

Except where the *building* is protected with a sprinkler system, *external walls* shall have an *FRR* of no less than 30/30/30 in the following circumstances:

- a) Single *household units* and attached side by side dwellings and outbuildings where the *external wall* is less than 1.0 m and less than 90° from the *relevant boundary*. The wall shall be *fire* rated to protect from both directions, and
- b) Any other *multi-unit dwellings* where the *external wall* is less than 5.0 m from the *relevant boundary*, except that windows more than 1.0 m from the *relevant boundary* need not 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

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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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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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

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

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 by *fire* appliances shall:

- 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*, and
- e) Provide access to a *hard-standing* within 20 m of:
 - i) an entrance to each unit contained in the *building*, and
 - ii) any inlets to *fire* sprinkler or *building fire* hydrant systems.

Comment:

Access to *buildings* for *fire* appliances will be generally via public streets, but provision is needed on large, *multi-building* sites to enable appliances to reach any *building*.

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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.

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 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

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.

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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.

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.

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

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.

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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.

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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:

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

References are to the relevant paragraphs, figures or tables in **C/VM1 and C/AS1** unless otherwise stated. References to Appendices are prefixed by the Appendix letter.

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