

DESIGN GUIDE

Fire Safety Residential Community Housing





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

Ministry of Business, Innovation & Employment (MBIE)

HĪkina Whakatutuki Lifting to make successful

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

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Guidance issued under Section 175 of the Building Act 2004

This design guide for residential community housing has been jointly developed by the Ministry of Business, Innovation & Employment (MBIE), Ministry of Health, New Zealand Fire Service, Housing New Zealand, Community Housing Aotearoa, New Zealand Disability Support Network, Disabled Person Assembly and a building control officer representative. It is published by the Chief Executive of MBIE as guidance under section 175 of the Building Act 2004 to help parties to comply with their obligations under this Act.

It is not mandatory to follow this design guide but, if followed, note that:

- it does not relieve any person of the obligation to consider any matter to which that information relates according to the circumstances of the particular case, and
- a building consent authority may have regard to this guidance but is not bound to accept a building design following this guidance as demonstrating compliance with the Building Code.

The intended users of this design guide are housing providers who provide housing to service providers funded by the Ministry of health and are subject to service management audit requirements. Other users will need to demonstrate to the BCA that this design guide is suitable for the intended use of the building.

All users of this design guide should satisfy themselves of the applicability of its content and should not act on the basis of any matter contained in the document without first considering and, if necessary, taking appropriate professional advice.

This guidance forms a framework for development of an alternative solution. The scope of the document covers specific variations to the Acceptable Solution paragraphs as appropriate for residential community housing. All other aspects of compliance are expected to meet C/AS1, C/AS2 or C/AS3 as appropriate or alternatively by specific design to the relevant New Zealand Building Code clauses.

Applications for building consent and management declarations

An application for building consent using this design guide requires the confirmation of the intended household characteristics of the building (as per Table 2.1). The household characteristics and subsequent designs have been developed on the basis that there will be suitable, audited management practices to assist with the evacuation.

The building consent authority will require information to be satisfied that the building design will be suitable for its intended use.

Note that in many instances the residence can be defined as a household unit.

This design guide recommends the building consent applicant to complete and supply a declaration provided in Appendix D Forms D1 and D2. Even if a building consent application for residential community housing does not follow this design guide, MBIE considers it best practice to include these declarations, which confirm that the management processes for the building are, and shall remain, adequate for the building's intended use. It is anticipated that funder contracts may require these declarations as a condition of funding.

This design guide is to be used for development of an Alternative Solution for protection from fire to support an application for Building Consent. The design guide is for Building Consent work.

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References

The editions listed below are the New Zealand and other Standards, and other documents referred to in this design guide (primary reference documents), along with their specific amendments.

Where the primary reference documents refer to other Standards or other documents (secondary reference documents), that may in turn also refer to other Standards or other documents, and so on (lower order reference documents), the version is the one in effect at the date this design guide was published.

Standards	Where quoted
Standards New Zealand	
NZS/BS 476:- Fire tests on building materials and structures Part 21: 1987 Methods for determination of the fire resistance of loadbearing elements of construction Part 22: 1987 Methods for determination of the fire resistance of non-loadbearing elements of construction	C4.1.1
AS/NZS 1680.1: 2006 Interior and workplace lighting	2.4.3
AS/NZS 2918: 2001 Domestic solid fuel burning appliances installation	7.1.1, 7.1.2, 7.3.3, 7.5.5, 7.5.12 Table 2.2 Figure 7.2
NZS 4512: 2010 Fire detection and alarm systems in buildings	C5.1.6 Table 2.2
NZS 4515: 2009 Fire sprinkler systems for life safety in occupancies of less than 2000 m ²	5.4.2, 6.1.1, B3.1.1 Table .1
NZS 4517: 2010 Fire sprinkler systems for houses	B4.1.1 Table 2.2
NZS 4520: 2010 Fire resistant doorsets	C5.1.1

Standards	Where quoted
NZS 4541: 2013 Automatic fire sprinkler systems	5.1.1, 5.4.2, B2.1.1
AS/NZS 5601: Gas installation Part 1: 2010 General installations Amend: 1	7.2.1, 7.2.2
NZS 6104: 1991 Emergency electricity supply in buildings	2.4.9
AS/NZS 60598 Luminaires Part 2.2: 2001 Particular requirements – recessed luminaires Amend AA	7.4.1
Standards Australia	
AS 1530:- Methods for fire tests on building materials, components and structures Part 1: 1994 Combustibility test for materials Part 2: 1993 Test for flammability of materials Part 4: 2014 Fire-resistance tests of elements of construction	4.4.2, C3.1 4.3.12, C4.1.1
AS 1691: 1985 Domestic oil-fired appliances – installation	7.3.1, 7.3.2
AS 2293: 2005 Part 1: Emergency escape lighting and exit signs for building systems design, installation and operation Part 2: Emergency evacuation lighting for buildings – Inspection and maintenance Part 3: Emergency escape luminaires and exit signs	2.4.8, 2.4.9 2.4.10
AS 4072:- Components for the protection of openings in fire-resistant separating elements Part 1: 2005 Service penetrations and control joints Amend: 1	C4.1.2

Standards	Where quoted
International Organization for Standardization	
ISO 5660:- Reaction-to-fire tests – Heat release, smoke production and mass loss rate Part 1: 2015 Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement)	C6.1.1, C6.1.2
ISO 9239 Reaction to fire tests for flooring Part 1: 2010 Determination of the burning behaviour using a radiant heat source	C2.1
American Society for Testing and Materials	
ASTM D 2898: 2010 Standard practice for accelerated weathering of fire-retardant-treated wood for fire testing	C6.1.3

Definitions

Alternative solution	A <i>building</i> solution that differs, in part or wholly, from the solutions offered by the Acceptable Solutions and Verification Methods, but complies with the performance requirements of the <i>Building Code</i> to the satisfaction of the <i>building consent authority</i> .
Building	As defined in section 8 and 9 of the <i>Building Act</i> .
Building Act	The <i>Building Act 2004</i> , which is the principal legislation dealing with <i>building</i> controls in New Zealand.
Building Code (NZBC)	The regulations made under section 400 of the <i>Building Act</i> .
Building consent	Consent to carry out <i>building</i> work granted by a <i>building consent authority</i> under section 49 of the <i>Building Act</i> .
Building element	Any structural and non-structural component or assembly incorporated into or associated with a <i>building</i> . Includes fixtures, services, drains, permanent mechanical installations for access, glazing, partitions, ceilings and temporary supports.
Cavity barrier	A construction provided to close openings within a concealed space against the passage of <i>fire</i> , or to restrict the spread of <i>fire</i> within such spaces.
Chimney	A non-combustible structure that encloses one or more <i>flues</i> , <i>fireplaces</i> or other heating appliances.
Chimney back	The <i>non-combustible</i> wall forming the back of a <i>fireplace</i> .
Chimney breast	The front <i>fireplace</i> wall construction above the <i>fireplace</i> opening.
Chimney jambs	The side walls of a <i>fireplace</i> .

Combustible	See <i>non-combustible</i> .
Communal service functions	Spaces that provide day-to-day service functions to support the sleeping areas, which have a higher fire risk than <i>direct support functions</i> . These are generally enclosed spaces and include, but are not limited to, offices, waiting rooms, lounges, storage rooms or cupboards, utility cupboards, linen cupboards (< 3 m ³), dining rooms, laundries and kitchens.
Controlled egress	The restriction of residents' movements by using locking devices to restrict free movement for escape.
Dead end	That part of an <i>open path</i> where escape is possible in only one direction.
Direct support functions	Activities that provide support to the <i>building's</i> main function and that are open areas of low fire risk and low fire load. These may include, but are not limited to, reception desks, nurses' stations, kiosks, tea bays, sanitary facilities and mail boxes.
Doorset	A complete assembly comprising a door leaf or leaves including: <ul style="list-style-type: none"> (a) any glazed or solid panels adjacent to or over the leaves within the door frame including hardware or other inbuilt features; and (b) a door frame, if any, with its fixings to the wall; and, (c) for a sliding or tilting door, all guides and their respective fixings to the lintel, wall or sill.
Escape height	The height between the floor level in the <i>firecell</i> being considered and the floor level of the required <i>final exit</i> which is the greatest vertical distance above or below that <i>firecell</i> .
Escape route	A continuous unobstructed route from any <i>occupied space</i> in a <i>building</i> to a <i>final exit</i> to enable occupants to reach a <i>safe place</i> , and that shall consist of <i>open paths</i> and <i>safe paths</i> .

Exitway	All parts of an <i>escape route</i> protected by <i>fire and smoke separations</i> , or by distance when exposed to open air, and terminating at a <i>final exit</i> .
External wall	Any exterior face of a <i>building</i> within 30° of vertical, consisting of <i>primary</i> and/or <i>secondary elements</i> intended to provide protection against the outdoor environment, but which may also contain <i>unprotected areas</i> .
Final exit	The point at which an <i>escape route</i> terminates by giving direct access to a <i>safe place</i> .
Fire	The state of combustion during which flammable materials burn producing heat, toxic gases, 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 <i>building</i> , which is enclosed by any combination of <i>fire separations</i> , <i>external walls</i> , roofs and floors.
Fire door	A <i>doorset</i> , single or multi-leaf, having a specific <i>fire resistance rating</i> , and in certain situations a smoke control capability, and forming part of a <i>fire separation</i> . The door, in the event of a <i>fire</i> , if not already closed, will close automatically and will be self-latching.
Fireplace	A space formed by the <i>chimney back</i> , the <i>chimney jambs</i> , and the <i>chimney breast</i> 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 <i>primary</i> and <i>secondary elements</i> as determined in the <i>standard test</i> 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 <i>structural adequacy</i> , <i>integrity</i> and <i>insulation</i> are satisfied, and is presented always in that order.

Fire safety systems	The combination of all active and passive protection methods used in a <i>building</i> 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 <i>building element</i> which separates <i>firecells</i> or <i>firecells</i> and <i>safe paths</i> , and provides a specific <i>fire resistance rating</i> (FRR).
Fire stop	A material or method of construction used to restrict the spread of fire within or through <i>fire separations</i> , and having a <i>FRR</i> no less than that of the <i>fire separation</i> .
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 surround <i>flues</i> .
Flue system	A series of interconnecting <i>flue</i> pipe casings which form a safe passage (<i>flue</i>) for conveying products of combustion from within an appliance to the outside of a <i>building</i> or structure.
Foamed plastics	<i>Combustible foamed plastic</i> polymeric materials of low density (typically less than 100 kg/m ³) and are classified as cellular polymers which are manufactured by creating a multitude of fine voids (typically 90 to 98%) distributed more or less uniformly throughout the product. Examples of <i>foamed plastics</i> are latex foams, polyethylene foams, polyvinyl chloride foams, expanded or extruded polystyrene foams, phenolic foams, ureaformaldehyde foams, polyurethane foams and polychloropene foams.

FRR	See <i>fire resistance rating</i> .
Group Number	<p>The classification number for a material used as a finish, surface, lining, or attachment to a wall or ceiling within an <i>occupied space</i> and determined according to the <i>standard test</i> methods for measuring the properties of lining materials.</p> <p>Note: The method for determining a <i>Group Number</i> is described in New Zealand Building Code Verification Method C/VM2 Appendix A.</p>
Group sleeping	A <i>firecell</i> containing communal sleeping accommodation for a specified number of people within the limitations set by this design guide.
Hold-open devices	A device which holds a <i>smoke control door</i> or <i>fire door</i> open during normal use, but is released by deactivating the device by an automatic <i>fire</i> detection system, allowing the door to close automatically under the action of a self-closing device.
Household characteristics	The <i>resident characteristics</i> of those <i>residents</i> needing the most assistance to exit a <i>building</i> .
Household unit	<p>This term:</p> <p>(a) means a building or group of buildings, or part of a building or group of buildings, that is:</p> <ul style="list-style-type: none"> 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 one household; but <p>(b) does not include a hostel, boarding house, or other specialised accommodation.</p>
Housing characteristics	A graded level of <i>fire safety systems</i> and <i>building</i> features commensurate with the abilities of the <i>residents</i> .

Independent means of escape	An <i>escape route</i> from a <i>firecell</i> that is separated from adjacent <i>firecells</i> by either distance or <i>fire-rated</i> construction.
Insulating material	A material that has a thermal conductivity of less than 0.07 W/mK.
Insulation	In the context of <i>fire</i> protection, the time in minutes for which a prototype specimen of a <i>fire separation</i> , when subjected to the <i>standard test</i> 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 <i>fire separation</i> , when subjected to the <i>standard test</i> for <i>fire</i> resistance, has prevented the passage of flame or hot gases.
Intermediate floor	Any upper floor within a <i>firecell</i> which because of its configuration, provides an opening allowing smoke or <i>fire</i> to spread from a lower to an upper level within the <i>firecell</i> .
Life rating	The <i>fire resistance rating</i> to be applied to elements of construction that allows movement of people from their location in a <i>building</i> to a <i>safe place</i> .
Means of escape	In relation to a <i>building</i> that has a floor area: (a) means continuous unobstructed routes of travel from any part of the floor area of that building to a place of safety; and (b) includes all active and passive protection features required to warn people of fire and to assist in protecting people from the effects of fire in the course of their escape from the fire.
Multi-unit dwelling	A <i>building</i> or use which contains more than one separate household unit (as per building regulations 1992)
Non-combustible	Materials shall be classified as <i>combustible</i> or <i>non-combustible</i> when tested to AS 1530 Part 1.

Notional boundary	The <i>boundary</i> which, for <i>fire safety</i> purposes, is assumed to exist between two <i>buildings</i> on the same property under a single land title.
NZBC	<i>See Building Code.</i>
Occupant load	The greatest number of people likely to occupy a particular space within a <i>building</i> . For the purpose of this design guide, <i>occupant load</i> is determined by adding the number of sleeping spaces to the maximum number of staff on duty at any one time.
Occupied space	Any space within a <i>building</i> in which a <i>person</i> will be present from time to time during the <i>intended use</i> of the <i>building</i> .
Open path	That part of an <i>escape route</i> (including <i>dead ends</i>) within a <i>firecell</i> where occupants may be exposed to fire or smoke while making their escape.
Other property	Any land or <i>buildings</i> , or part of any land or <i>buildings</i> , that are: (a) not held under the same <i>allotment</i> ; or (b) not held under the same <i>ownership</i> ; and includes a <i>road</i> .
Outbuilding	A <i>building</i> that is not intended for human habitation, and is accessory to the principal use of associated <i>buildings</i> . Examples of <i>outbuildings</i> are: a carport, farm <i>building</i> , garage, greenhouse, machinery room, private swimming pool, public toilet or shed.
Owner	In relation to land and any <i>buildings</i> 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 In relation to land and any <i>buildings</i> on the land: (b) includes: iii) the <i>owner</i> of the fee simple of the land; and

	iv) for the purposes of <i>Building Act</i> sections 32, 44, 92, 96, 97, and 176(c), any person who has agreed in writing, whether conditionally or unconditionally, to purchase the land or any leasehold estate or interest in the land, or to take a lease of the land, and who is bound by the agreement because the agreement is still in force.
Penetration	A <i>building element</i> passing through an opening in a <i>fire separation</i> .
Primary element	A <i>building element</i> providing the basic loadbearing capacity to the structure, and which if affected by fire may initiate <i>instability</i> or premature structural collapse.
Property rating	The <i>fire resistance rating</i> to be applied to elements of <i>construction</i> that allows for protection of <i>other property</i> .
Relevant boundary	The <i>boundary</i> of an <i>allotment</i> that is <i>other property</i> in relation to the <i>building</i> in question and from which is measured the separation between the <i>building</i> and that <i>other property</i> ; and for the <i>external wall</i> of any <i>building</i> , the <i>relevant boundary</i> is the nearest of: <ul style="list-style-type: none"> (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

	<p>access and occupation or to which two 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</p> <p>(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.</p>
Resident	A person living in <i>residential community housing</i> .
Resident characteristics	The abilities and requirements of each <i>resident</i> as established by the <i>service provider</i> .
Residential community housing	A residential <i>building</i> or part of a <i>building</i> where <i>support services</i> are provided to the <i>building's residents</i> by a <i>service provider</i> .
Service provider	<p>A person or organisation that provides <i>support services</i> to a <i>resident</i> or <i>residents</i> within <i>residential community housing</i>.</p> <p><i>Service providers</i> have audited management procedures in place.</p>
Safe place	A place outside, and in the vicinity of, a single <i>building</i> unit from which people may safely disperse after escaping the effects of a <i>fire</i> . It may be a place such as a street, open space, public space, or an adjacent <i>building</i> unit.
Secondary element	A <i>building element</i> not providing load bearing capacity to the structure and that if, affected by fire, instability or collapse of the <i>building</i> structure will not occur.

Self-closer	A mechanical device connected with a door that ensures that the door latches will close in the event of a fire to maintain the effectiveness of the fire separation.
Smokecell	A space within a <i>building</i> which is enclosed by an envelope of <i>smoke separations</i> , or <i>external walls</i> , roofs, and floors.
Smoke control door	A <i>doorset</i> that complies with Appendix C, C4.1.2 of this design guide.
Smoke separation	Any <i>building element</i> able to prevent the passage of smoke between two spaces. <i>Smoke separations</i> shall: <ul style="list-style-type: none"> (a) be a smoke barrier complying with BS EN 12101 Part 1, or (b) consist of rigid <i>building elements</i> capable of resisting without collapse: <ul style="list-style-type: none"> i) a pressure of 0.1 kPa applied from either side, and ii) self-weight plus the intended vertically applied live loads, and (c) form an imperforate barrier to the spread of smoke, and (d) be of, or achieve, a <i>non-combustible construction FRR</i> of 10/10/-, except that non-fire resisting glazing may be used if it is toughened or laminated safety glass.
Stability	In the context of <i>fire</i> protection, the support provided to a <i>building element</i> having an <i>FRR</i> 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 <i>fire</i> .
Standard test	A test method which is recognised as being appropriate for the fire protection properties being assessed.

Structural adequacy	In the context of the <i>standard test</i> for fire resistance, the time in minutes for which a prototype specimen has continued to carry its applied load within defined deflection limits.
Support services	Support given to a <i>resident</i> to carry out their day-to-day activities that is provided by others, whether full-time or part-time and whether paid or unpaid.
Surface finish	The combination of a surface coating and substrate material on surfaces of <i>building elements</i> exposed to view. It can be an applied decorative coating or the uncoated <i>building element</i> itself. For interior surfaces the requirements are evaluated in terms of a <i>Group Number</i> . For exterior surfaces the requirements are evaluated in terms of rate of heat release as determined by Appendix C Paragraph C6.1.
Travel distance	The length of the <i>escape route</i> as a whole or the individual length of its parts, namely: <ul style="list-style-type: none"> (a) <i>open paths</i>, and (b) <i>safe paths</i>.
Unprotected area	In relation to an <i>external wall</i> of a <i>building</i> , means: <ul style="list-style-type: none"> (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 <i>external wall</i> which has <i>combustible</i> material more than 1.0 mm thick attached or applied to its external face, whether for cladding or any other purpose.

Part 1: General

1.1 Introduction and scope

Introduction

This design guide is guidance to assist the preparation of an *Alternative Solution* for establishing compliance with NZBC Clauses C1–C6 (Protection from fire) for *residential community housing*.

Words in *italics* are defined at the front of this document.

1.1.1 Scope

The scope of this design guide is restricted to *residential community housing* where support services are either funded by the Ministry of Health, or where the organisation providing *support services* has a similar service management audit procedure in place. This includes the following:

- (a) single-storey or two-storey dwellings providing accommodation for no more than 10 residents; and where the dwelling is within the limitations of Table 2.1;
- (b) *multi-unit dwellings* containing *residential community housing* that provide accommodation for no more than 10 residents per unit, with no more than one unit above another, where each unit has an escape route independent of all other units; and where the dwelling is within the limitations of Table 2.1; and
- (c) all garages or carports that are associated with the *residential community housing*.

Note: this design guide is not intended to apply to housing owned or rented by people who have chosen to receive support in their own homes.

1.1.2 Outside the scope of this design guide

Buildings or parts of *buildings* that are:

- (a) not within the scope of Paragraph 1.1.1; or
- (b) multi-storey apartments or commercial buildings.

1.1.3.

This design guide does not provide for the *building* features that would be required for a stay-in-place strategy.

1.2 Using this design guide

1.2.1

The process for using this design guide is as follows.

Step 1: Determine the applicability of this design guide

Establish whether the proposal falls within the scope of this design guide (see Paragraphs 1.1.1 to 1.1.3).

Step 2 Determine the *resident* characteristics

The *service provider* shall establish the abilities and requirements of each *resident* in order to determine the *resident characteristics* from Table 1.1.

Step 3: Evaluate the household

Establish the *housing characteristics* and then determine the *building's* minimum *housing type* (see Part 2).

An application for *building consent* using this design guide requires the confirmation of the intended *household characteristics* (as per Table 2.1).

Example:

The *housing characteristics* are determined by those *residents* needing the most assistance to exit a *building*. The number of *residents* in this category may or may not equate to the total number of residents. For example, the house may accommodate ten residents, with nine who need a low level of support (*resident characteristic* LSR), and just one requiring a very high level of support (VHSR). The *household characteristics* are VHSR and the number of *residents* for consideration in Table 2.1 would therefore be one.

Step 4: Determine the fire safety requirements specific for residential community housing

Determine the fire safety requirements of this design guide (see Parts 2–7), based on the *housing type*, *occupant load*, number of *residents* for consideration, the *building's* dimensions and other *building* features.

Step 5: Establish other NZBC fire safety requirements

Using the relevant *building* information establish any other requirements for *means of escape* or protection of *other property*.

Step 6: Complete the occupancy declarations

This design guide recommends the declaration Forms D1 and D2 in Appendix D are completed and included with an application for *building consent*.

Note:

Even if this design guide is not followed in its entirety, it is considered best practice to include these declarations when applying for a *building consent*. These declarations confirm that the management processes for the *building* are, and shall remain, adequate for the *building's* intended use.

Table 1.1	<i>Resident characteristics</i>
Low Support Resident (LSR)	<ul style="list-style-type: none"> • Understands verbal, electronic, or other fire warnings with little or no prompting; and • Has the physical ability and means to exit the <i>building</i> with a low level of assistance (including when woken from sleep).
Medium Support Resident (MSR)	<ul style="list-style-type: none"> • Requires a moderate degree of assistance in understanding verbal, electronic, or other fire warnings: and/or • Requires a moderate degree of assistance to exit the <i>building</i> within appropriate timeframes.

High Support Resident (HSR)	<ul style="list-style-type: none"> • Requires significant levels of assistance in understanding verbal, electronic, or other fire warnings; and/or • Requires significant levels of assistance in physically exiting the building within appropriate timeframes.
Very High Support Resident (VHSR)	<ul style="list-style-type: none"> • Requires full assistance from their service provider to evacuate the <i>building</i> within appropriate timeframes.

1.3 Alterations to existing buildings

This design guide can be used to undertake a gap assessment for establishing compliance as near as is reasonably practicable (ANARP) in accordance with section 112 of the *Building Act*.

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

2.1 Provision of firecells

2.1.1 Firecell floor area limits

The floor area of a *firecell* within *residential community housing* shall not exceed 500 m².

2.2 Fire safety systems

2.2.1

The *fire safety systems* required for *buildings* within the scope of this design guide shall be determined as follows:

Step 1: Determine the *residential community housing type*

From Table 2.1 determine the minimum housing type required from the *household characteristics* (as identified in Part 1 of this design guide), and the maximum number of *residents* determined from the evaluated household (see Paragraph 1.2.1 Step 3). If *controlled egress* is also required see Paragraph 3.2.3.

Step 2: Determine the *building features and fire safety systems*

Using Table 2.2, determine the required *building features* and minimum *fire safety systems*.

Note:

Additional fire safety systems can be voluntarily included within the property.

Table 2.1	Housing type	
<i>Household characteristics</i>	Number of residents*	Minimum housing type
LSR	1–6	A
LSR	7–10	B
MSR	1–3	B
MSR	4–10	C
HSR	1–2	C
HSR	3–10	D
VHSR	1	C
VHSR	2–10	D

Notes:

1. For definitions of LSR, MSR, HSR and VHSR see Table 1.1 and the example in Paragraph 1.2.
2. If *controlled egress* is required, see Paragraph 3.2.3 for the specified housing types and associated features.

* Determined from methodology described in Paragraph 1.2.1.

Table 2.2	<i>Building features and minimum fire safety systems</i>
<i>Housing type</i>	
A	<ul style="list-style-type: none"> • Maximum of two storeys • Single firecell • Interconnected smoke and heat alarms to NZS 4514
B	<ul style="list-style-type: none"> • Maximum of two storeys • A minimum of two firecells or a domestic sprinkler system to NZS 4517 • Interconnected smoke and heat alarms to NZS 4514

C	<ul style="list-style-type: none"> • Single storey with an <i>escape height</i> of less than 2.0 m • A minimum of two firecells • Interconnected smoke and heat alarms to NZS 4514 • Domestic sprinkler system to NZS 4517
D	<ul style="list-style-type: none"> • Single storey with an <i>escape height</i> of less than 2.0 m • A minimum of two firecells • Smoke detectors to NZS 4512 • Domestic sprinkler system to NZS 4517

2.3 Fire resistance ratings

Fire resistance ratings values – life and property ratings

2.3.1

The *fire resistance ratings (FRRs)* for the life and *property ratings* are both 30 minutes [(30)/30/30].

An *insulation* rating is not required where sprinklers are provided.

2.3.2

Areas of the external wall that are not permitted to be *unprotected areas* shall be rated for fire exposure from both sides equally where:

- (a) walls are within 1.0 m of the *relevant boundary*, or
- (b) the *final exit* is one or more floor levels below any sleeping use.

2.4 Visibility in escape routes

2.4.1 Location

Where visibility in *escape routes* is required (see Table 2.2) it shall be provided in the *escape routes* and at *final exits* from sleeping areas in accordance with NZBC Clause F6.

2.4.2

If required, the emergency lighting used to meet NZ Building Code clause F6 it must provide a direct illuminance of no less than:

- (a) 1.0 lux at every change in level in an *escape route*, and
- (b) 0.2 lux everywhere else.

Photoluminescent signage and wayfinding can be used as an alternative solution method for meeting the requirements of NZ Building Code clause F6.

2.4.3 Method of measurement

Illuminance must be measured in accordance with Appendix B of AS/NZS 1680.1, with measurements made at floor level.

2.4.4

Measurements must not be made within 500 mm of vertical surfaces. Minimum illuminance will generally occur furthest from the luminaire(s), and at least four measurements shall be made around each luminaire on both axes. If the layout of luminaires is symmetrical, the number of measurements may be reduced in accordance with Appendix B of AS/NZS1680.1 Requirements.

2.4.5

Daylight or spill light from adjacent rooms must be excluded and the lamps switched on and allowed to stabilise before measurements are taken.

2.4.6 Start up and light output

The emergency lighting system must initiate within the following times and provide:

- (a) 10% of the design illuminance level in 20 seconds, and
- (b) 80% of the design illuminance level in 60 seconds in all other locations.

2.4.7 Duration

Emergency lighting must have a minimum duration of 30 minutes.

2.4.8 Installation, maintenance and equipment

An emergency lighting system must be installed in accordance with:

- (a) AS 2293: Parts 1 and 3 as amended by Appendix B (F6/AS1), and
- (b) NZBC Clause G9, Electricity.

Emergency lighting installations must be commissioned after the successful completion of tests to confirm automatic operation upon tripping or failure of the power supply to the normal lighting circuits and must include testing of any phase failure devices. Such tests must be repeated on the completion of any addition to, or alteration of, the installed system.

2.4.9

Notwithstanding the requirements of Paragraph 2.4.8(a) a generator that is installed and maintained in accordance with NZS 6104, as amended by Appendix C F8/AS1, is an acceptable emergency power supply to meet Section 3 of AS 2293 Part 1, providing the emergency lighting has priority as the initial load.

2.4.10

Inspection, maintenance and reporting procedures for central battery and single point systems shall be performed in accordance with AS/NZS 2293 Part 2.

2.5 Exit signs

2.5.1

Illuminated exit signage is not a requirement of this design guide.

2.5.2

For *housing type D* a non-illuminated sign shall be provided above each *final exit*.

Part 3: Means of escape

3.1 Escape routes

3.1.1 Number of escape routes

Each firecell shall have independent means of escape provided that the dead end open path and total open path limitations are not exceeded. The minimum number of escape routes shall be as specified in Table 3.1.

Table 3.1	Minimum number of escape routes
Housing type	
A	1
B	1
C	2
D	2

3.1.2 Height and width of escape routes

Height requirements within escape routes shall be as follows:

- (a) the clear height shall be no less than 2100 mm across the full width, except that isolated ceiling fittings not exceeding 200 mm in diameter may project downwards to reduce this clearance by no more than 100 mm, and
- (b) any door opening within or giving access to any escape route shall have a clear height of no less than 1955 mm for the required width of the opening.

3.1.3

Corridor widths shall be in accordance with Table 3.2.

Table 3.2	Minimum clear width of <i>escape routes</i> (mm)	
	<i>Housing type</i>	Door
A	710	900
B	760	1000
C	760	1000
D	860	1200

Notes:

Doors and *escape routes* that beds will need to pass through during evacuation shall be of sufficient width to allow the passage of a bed and essential life support equipment. Due consideration should be given to the requirements of NZBC Clause D.

3.1.4 Length of *escape routes*

The lengths of *dead ends* and total *open paths* within *residential community housing* shall not exceed:

- (a) 18 m *dead end*, and
- (b) 36 m total *open path*.

(See Figure 3.2.)

3.1.5 Stairs on *escape routes*

To calculate stair length, take the plan length measured on the stairs' centerline, multiply by 1.2, and add the length of each landing.

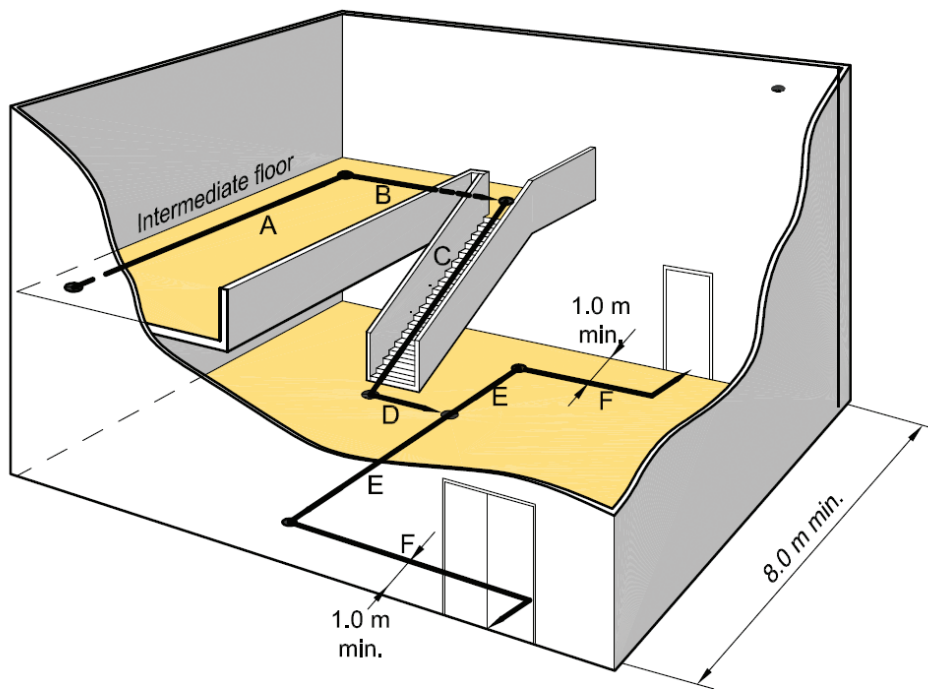
3.1.6 *Open paths*

Where two or more designated *escape routes* are required they shall be separated from each other and remain separated until reaching an *exitway* or *final exit*. Separation shall be achieved by diverging (from the point where two *escape routes* are required) at an angle of no less than 90° until separated by:

- (a) a distance of 8.0 m, or
- (b) smoke separations and smoke control doors inclusive of self-closers.

(See Figures 3.1 and 3.2.)

Figure 3.1: Intermediate floor open path length
New Zealand Building Code Acceptable Solution C/AS3

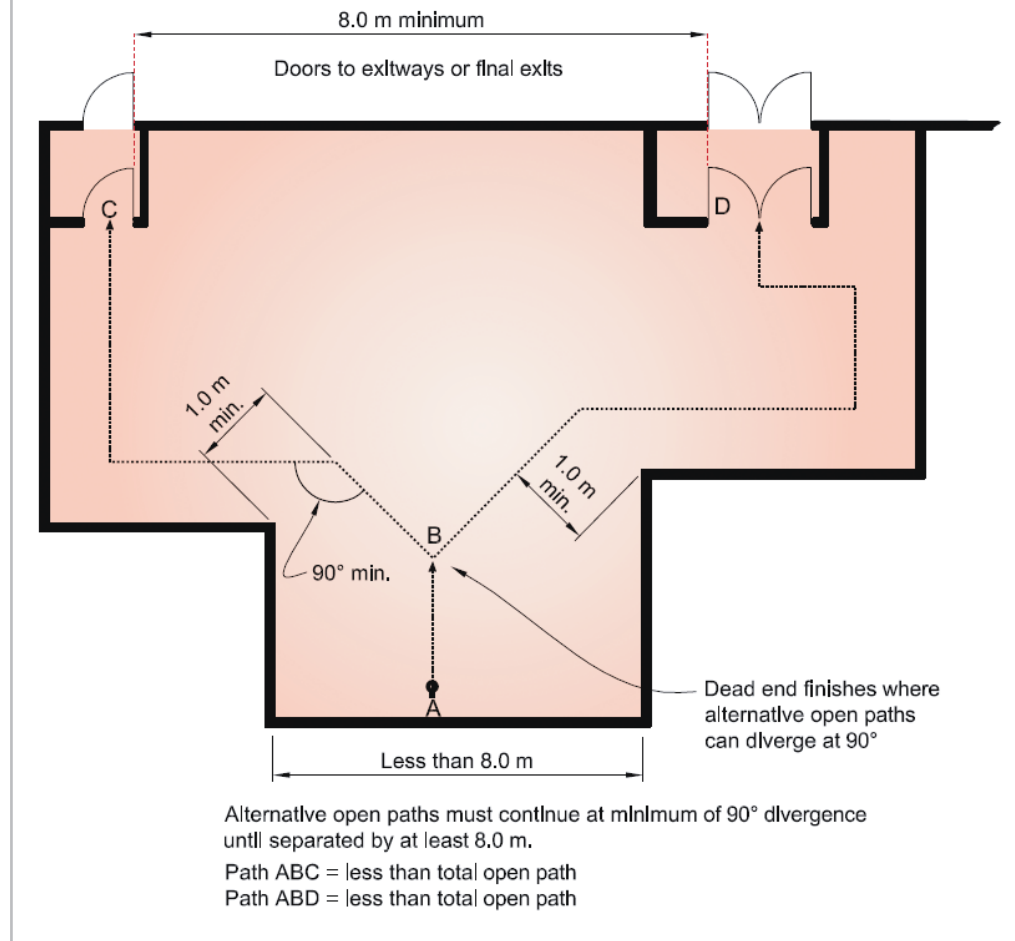


$A + B = 1.5 \times \text{measured length.}$
 $C = 1.2 \times \text{stair plan length}$

$A + B + C + D$ must not exceed maximum permitted dead end length in Table 3.2.

$A + B + C + D + E + F$ must not exceed maximum permitted open path length in Table 3.2.

Figure 3.2: Alternative open path separation
New Zealand Building Code Acceptable Solution C/AS3



3.1.7 Passing into an adjacent firecell

Where two or more *firecells* are required, the *means of escape* serving both *firecells* shall have:

- no fewer than two directions of escape (one being into the adjacent *firecell*), separated as required by Paragraph 3.1.6, and
- at least one *escape route* leading directly to a *final exit* or external *safe path* that is totally independent of the *escape route* into and from the adjacent *firecell*.

3.1.8 External safe paths

Where an *escape route* enters a space exposed to the open air (eg. an open stairway, a balcony, across a roof or a ground level path) it shall not pass within 2.0 m of any *unprotected areas* where the *firecell* is unsprinklered and 1.0 m when sprinklered, on the way to a *safe place*.

3.1.9

Except where the separation distance requirements of Paragraph 3.1.8 are achieved:

- (a) *external walls* and roofs adjacent to external *escape routes* shall comply with the *FRR* requirements of Part 5 of this design guide and have no *unprotected areas*, and
- (b) if the *escape route* is a balcony with a single direction of escape, and the vertical distance between the underside of the balcony and the closest *unprotected area* in the *external wall* below is less than 5.0 m, balcony barriers shall:
 - i) have no openings, and
 - ii) be protected with a material that has a *Group Number* of 1.

3.1.10 Single escape routes

Single *escape routes* are permissible only where the *dead end open path* is within the limitations of Paragraph 3.1.4 and the *occupant load* does not exceed 50 people.

3.1.11 Accessibility

Escape routes must comply with NZBC Clause D1. Ramps, stairs, ladders, landings, handrails, doors, vision panels and openings shall comply with Acceptable Solution D1/AS1.

3.2 Doors on escape routes

3.2.1

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

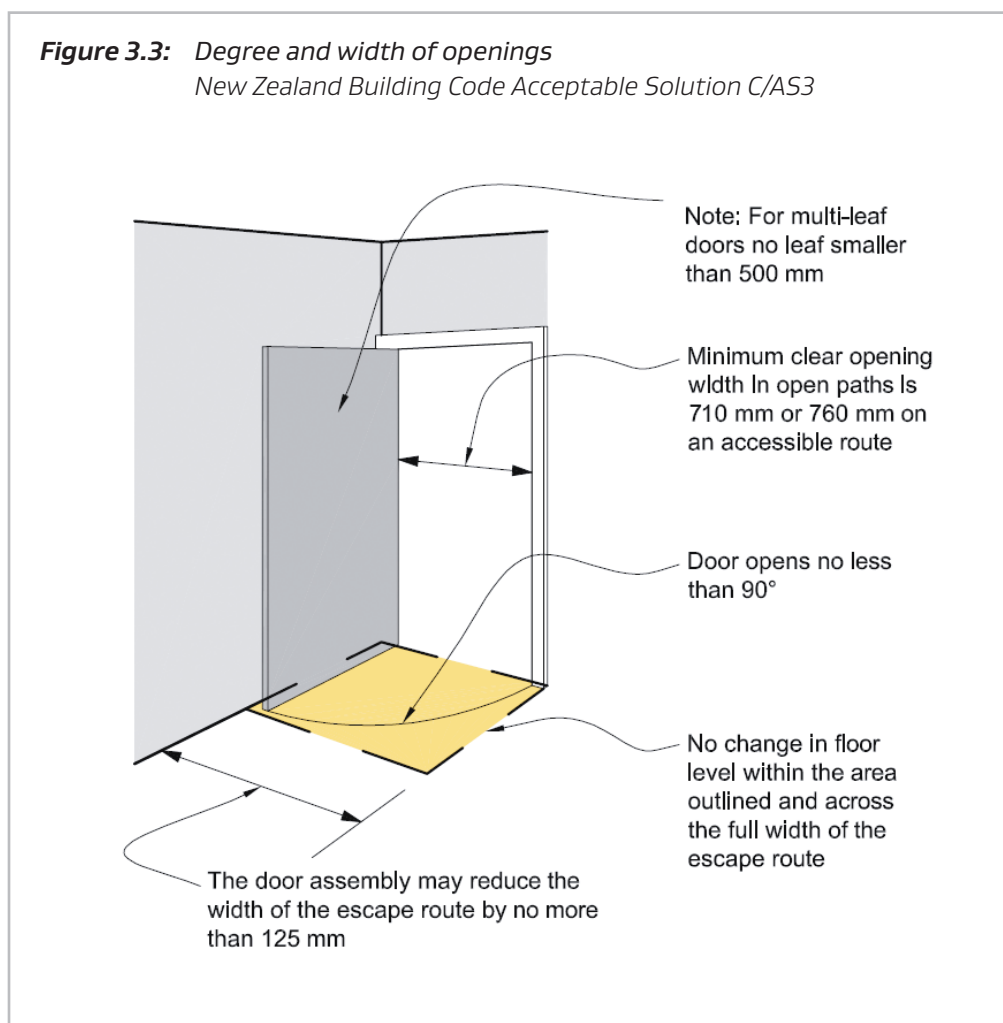
- (a) be hinged to pivot on the vertical edge only, however sliding doors may be used where the residence has an occupant load of less than 20; and
- (b) be fitted with simple fastenings that can be readily opened from the direction approached by the people escaping; and
- (c) shall not be fitted with locking devices, other than in accordance with Paragraph 3.2.2; and
- (d) have lever door handles; and
- (e) if they are fire doors they shall have the mechanical capacity to close and latch in the event of a fire; and
- (f) if the residential community housing contains, or is likely to contain HSR or VHSR residents as defined in Table 1.1, the doors shall be wide enough to allow a bed to pass through.

3.2.2 Locking devices

If the *building* is occupied, locking devices shall:

- (a) be clearly visible, located where such a device would normally be expected and, in the event of fire, either be:
 - i) designed to be easily operated without a key or other security device, and allow the door to open in the normal manner; or
 - ii) readily opened by an alternative method satisfying the intent of Paragraph 3.2.3; and

Figure 3.3: Degree and width of openings
New Zealand Building Code Acceptable Solution C/AS3



- (b) if they are of an electromechanical type, in the event of a power failure or door malfunction they must automatically switch to the unlocked (fail-safe) condition.

3.2.3 Controlled egress

Where the *service provider* identifies the need for *controlled egress* this design guide requires the *housing type* (and associated *building features* and *fire safety systems*, as specified in Table 2.2) to be either C or D. In addition to these limitations the number of *controlled egress doors* within any one *building* (excluding external doors; see Paragraph 3.2.1) shall not be more than one third of the number of highest category *residents*. If this ratio is exceeded Acceptable Solution C/AS3 or another *Alternative Solution* applies.

3.2.4 Direction of opening

In the event of a fire, doors that beds will need to pass through shall have the capacity to swing in the direction of escape. Furthermore, with the exception of doors leading into bedrooms, doors on *escape routes* leading to two exits are required to swing in both directions and shall have vision panels installed in accordance with NZS 4520.

3.2.5 Degree and width of opening

Doors on *escape routes* shall satisfy the following requirements (see Figure 3.3):

- (a) they shall provide a clear opening width of no less than that stipulated in Table 3.2; and
- (b) *final exit* doors shall not reduce a clear *exitway* or corridor width required by Table 3.2 by more than 125 mm; and
- (c) they shall open at no less than 90 degrees; and
- (d) they shall open onto a floor area that is on the same level on both sides of the door for no less than the arc of the door swing.

Refer to NZBC clause D1

3.2.6 Door opening forces

Door opening forces shall comply with NZBC Clause D1 and Acceptable Solution C/AS3.

3.2.7 Hold-open devices

Detector-activated *hold-open devices* may be fitted to *fire doors* or *smoke control doors* if these are required due to the volume of residents using the doors.

3.3 Door signs

3.3.1

All *fire doors* and *smoke control doors* shall have signs complying with NZBC Clause F8.

Part 4: Control of internal fire and smoke spread

4.1 Fire separations for housing types

4.1.1 Housing type A and sprinklered type B

Where a single *firecell* is permitted for housing type A and sprinkler-protected type B, these *buildings* may consist of a single *firecell* and be *fire separated* from *other property* and from *household units* with *fire separations* with an *FRR* of 30/30/30.

4.1.2 Housing types B, C and D

Where a minimum of two *firecells* is required for housing types B (non-sprinkler protected), C and D, in addition to the requirements of Paragraph 4.1.1 a *fire separation* with an *FRR* of 30/30/30 shall be provided to separate the sleeping area *firecell* from non-sleeping area *firecell* (see Figure 4.1).

The non-sleeping area *firecell* will contain *communal service functions* such as day, living and dining rooms as well as kitchens and storage areas.

The sleeping area *firecell* will contain a maximum of six beds. This *firecell* is defined as a *group sleeping area*.

4.1.3 Group sleeping areas

Group sleeping areas in housing types B, C and D shall contain no more than six beds and shall be fire separated from non-sleeping areas by an *FRR* of 30/30/30.

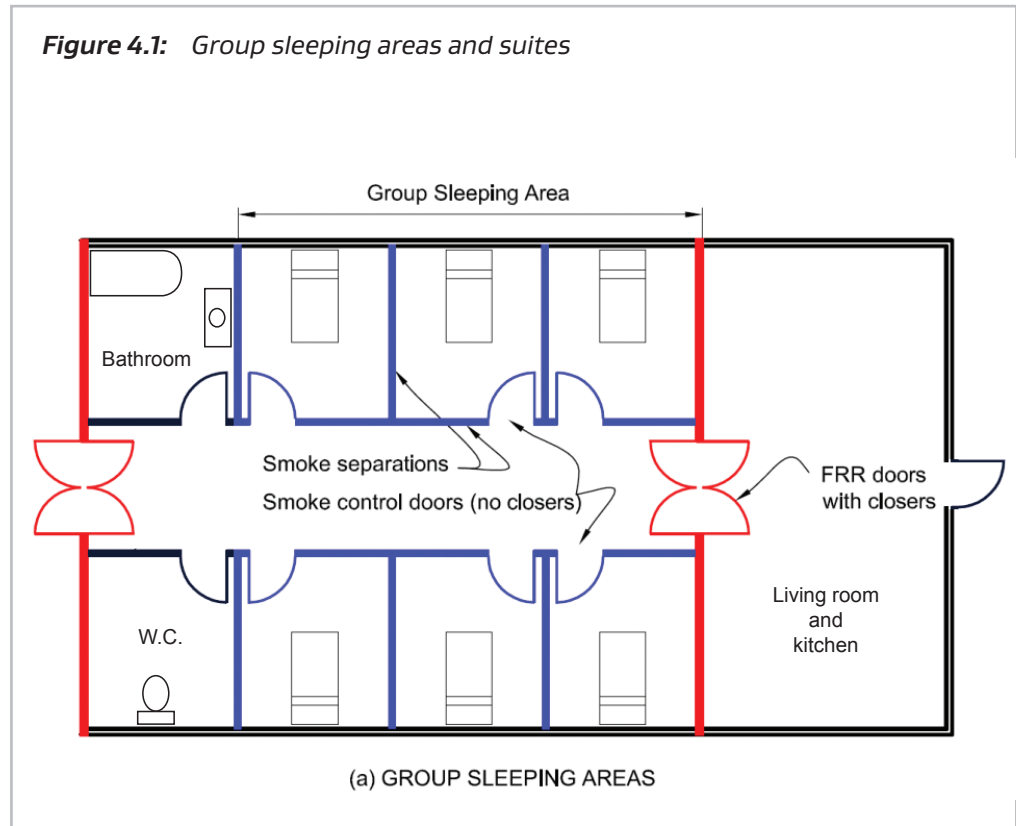
4.1.4 Subdivision of group sleeping areas

The sleeping areas of housing types B, C and D may be subdivided with full height *smoke separations* including *smoke control doors* that do not need to be fitted with *self-closers*. *Direct support functions* such as bathrooms may be included within the *group sleeping area firecell* (see Figure 4.1).

Communal service functions (see Paragraph 4.1.2), shall not be located within a sleeping area *firecell* and shall be separated from the sleeping area *firecell* with an *FRR* of 30/30/30 (see Figure 4.1).

Fire separations shall continue to the underside of the roof cladding. *Smoke separations* need only continue to the underside of the ceiling provided this ceiling is solid in construction and any *penetrations* are suitably smoke stopped.

Figure 4.1: Group sleeping areas and suites



4.2 Fire stopping

4.2.1 Introduction

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

4.2.2 Fire stops

Fire stops shall have an *FRR* of no less than 30 minutes, and shall be tested in accordance with Appendix C Paragraph C3.1.

4.2.3

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

4.2.4

The material selected for use as *fire stops* shall have been tested for the type and size of the gap or *penetration*, and for the type of material and construction used in the *fire separation*.

4.2.5

A *fire stop* for a *penetration* is not required to have an *insulation* rating if means are provided to keep *combustible* materials at a distance of 300 mm from the *penetration* and the *fire stop* to prevent ignition.

4.3 Firecell construction

4.3.1

Each of the *building elements* enclosing the *firecell* shall achieve an *FRR* of no less than [(30)/30/30].

4.3.2

Fire and *smoke separations* shall have no openings other than:

- (a) for closures such as *doorsets*, (see Paragraphs 4.3.14 to 4.3.16) and
- (b) *Penetrations* complying with Paragraphs 4.2.2 to 4.2.5.

4.3.3

Firecell and *smokecell* effectiveness shall be maintained by ensuring the continuity of *fire* and *smoke separations* at separation junctions, and around joints where closures, protected shafts and *penetrations* occur.

4.3.4 Junctions of fire separations

Where *fire separations* meet other *fire separations* or *fire-rated* parts of *external walls*, they shall either be bonded together or have the full length of the junction be *fire stopped* (see Figures 4.2 and 4.3).

4.3.5 Junctions with roof

Vertical *fire separations* and *external walls* shall end as close as possible to the external roof cladding and *primary elements* providing roof support, with any gaps *fire stopped* (see Figures 4.2 and 4.3).

4.3.6 Ceiling space firecells

In housing types C and D the ceiling space may be constructed as a separate *firecell* above the *firecells* below, provided that the ceiling is a *fire separation* rated from below. In this situation *vertical fire separations* in the *firecells* below may terminate at the ceiling.

4.3.7 Concealed spaces

The spread of fire in concealed spaces and cavities shall be avoided by ensuring that extensive voids do not pass from one *firecell* to another, and by blocking off smaller voids with *cavity barriers* or, where appropriate, by using *fire stops*.

4.3.8 Subfloor spaces

In *buildings* with an unoccupied subfloor space between the ground and lowest floor the *FRR* of that floor shall be in accordance with Paragraph 2.3, however no *FRR* is required if the following conditions are satisfied:

- (a) *vertical fire separations* and *external walls* extend down to ground level and enclose the space; and
- (b) access is available only for intermittent servicing of plumbing, drainage or other static services; and
- (c) the space is not used for storage and does not contain any installation such as machinery or heating appliances that could create a *fire hazard*, except when *fire separated* from the rest of the subfloor space.

4.3.9 Cavity barriers between walls and floors

Any concealed space that may be a path for *fire spread* within *internal walls* or *floors* that are *fire separations*, or within *external walls*, shall have *cavity barriers* or shall be *fire stopped* at all common junctions.

4.3.10 Exceptions to cavity barrier requirements

Cavity barriers are not required in the following circumstances:

- (a) below a floor next to the ground if the concealed space is:
 - i) less than 1.0 m in height, or
 - ii) not normally accessed and has no openings litter can accumulate in, or
- (b) if the concealed space results from the over-cladding of an

existing *external wall* or roof, provided that the existing cladding is *non-combustible*, or

- (c) in a wall or roof panel system that achieves a *Group Number* no greater than 2 when exposed to fire.

4.3.11 Cavity barrier construction

Cavity barriers shall:

- (a) not reduce the *FRR* required for the element they are installed in; and
- (b) where practical, be tightly fitted and mechanically fixed to rigid construction, but if this is not possible gaps shall be *fire stopped*; and
- (c) be fixed in a way that avoids impairment of their *fire separation* function as a result of:
 - i) *building* movement due to subsidence, shrinkage or thermal change, or
 - ii) collapse or failure of their components or fixings, or of abutting materials and any *penetrations* during a fire.

4.3.12 Sealing of gaps

To avoid smoke moving through *fire* and *smoke separations*, gaps shall be sealed with *fire resistant* materials that comply with AS 1530 Part 4 in their intended application if they are located:

- (a) in *smoke separations*, and between *smoke* and *fire separations*; and
- (b) around glazing in *smoke separations*; and
- (c) between *fire* or *smoke separations* and unrated parts of *external walls*.

4.3.13

Gaps around *penetrations* shall be *fire stopped* (see Paragraph 4.2).

4.3.14 Doorsets

Doorsets shall achieve an:

- (a) *FRR* of -/30/30 *FRR* if unsprinklered; or
- (b) *FRR* of -/30/- *FRR* if sprinklered; and

shall be clearly marked to show their *FRR* and smoke stopping capability. (refer to Appendix C)

4.3.15 Smoke control doors

Smoke control doors complying with Appendix C Paragraph C5.1.2 shall be provided in *housing types* C and D if the *group sleeping area firecell* is subdivided with full height partitions (see Paragraph 4.1.4).

4.3.16

Doorsets that are required to be *fire doors* shall comply with Appendix C Paragraph C5.1.1 and the smoke control capability outlined in Paragraph C5.1.2. Vision panels that are required in *fire doors* (see Paragraph 3.2) shall have *fire resistant glazing* with the same *integrity* rating as the door, and the door assembly shall be installed in accordance with Paragraph 3.2 and Appendix C.

4.4 Surface finishes

4.4.1 Foamed plastics

Foamed plastic building materials and exposed *combustible insulating materials* shall not be used in *residential community housing*.

4.4.2 Suspended flexible fabrics

When tested to AS 1530 Part 2, suspended flexible fabrics shall, within all *occupied spaces*:

- (a) have a flammability index of no greater than 12; and
- (b) when used as underlay to roofing or exterior cladding that is exposed to view, have a flammability index of no greater than 5.

Figure 4.2: Junctions of fire separations – 1
 New Zealand Building Code Acceptable Solution C/AS3

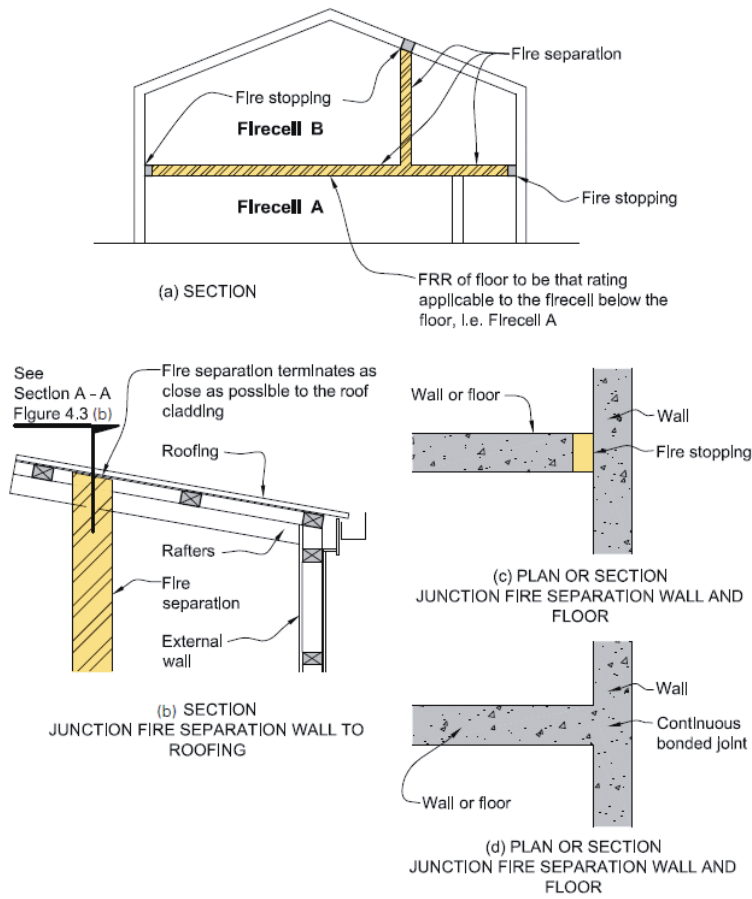
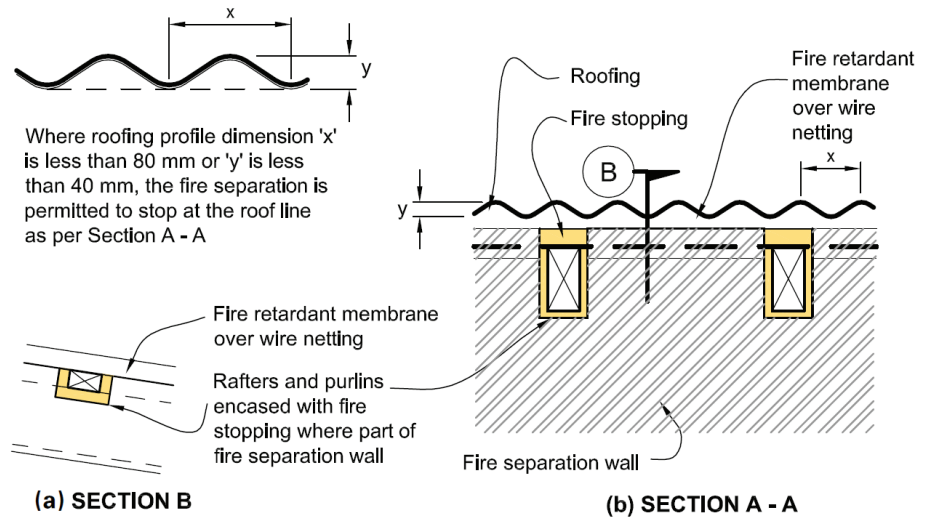


Figure 4.3: Junctions of fire separations – 2
 New Zealand Building Code Acceptable Solution C/AS3



Part 5: Control of external fire spread

5.1 Fire resistance ratings (FRR)

5.1.1

External walls shall have an FRR of no less than 30/30/30 in the following circumstances:

- (a) *outbuildings, single unit dwellings 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 an FRR, the windows do not need to be *fire rated*.

Where the *building* is protected by a sprinkler system complying with NZS 4541 *external walls* do not require an FRR.

5.1.2

When the *unprotected area* of an *external wall* is permitted to be 100% but the *primary elements* in the line of that wall are required to be *fire rated*, the rating of those *primary elements* shall be the *life rating 30 minutes' FRR*.

5.2 Firecells on the same property

5.2.1

Separate *household units* in the same *building* shall be separated with an FRR of no less than 30/30/30. The wall shall be *fire rated* from both directions.

5.2.2

For separate structures that have a sleeping use on the same property, where the separation of *external walls* is less than 1.0 m apart, at least

one *external wall* shall have an *FRR* of no less than 30/30/30. The wall shall be *fire* rated from both directions.

5.2.3 Notional boundaries – firecells on the same property

For *firecells* 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*. In such cases, when applying Paragraph 5.1 the words *relevant boundary* shall be interpreted as *notional boundary*.

5.3 Roof projections

5.3.1

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.

5.3.2

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* they project from shall have an *FRR* of no less than 30/30/30.

5.4 Protection from a lower roof in multi-unit dwellings

5.4.1

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.

5.4.2

Fire rating of the roof is not required if the *household unit* is protected with a sprinkler system complying with NZS 4515 or NZS 4541 (see Figure 5.2).

5.5 Exterior surface finishes

External wall cladding systems shall be tested to the *standard test* described in Appendix C Paragraph C6.1 and the peak rate of heat release and the total heat released shall not exceed the limits given in Table 5.1.

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

5.6 Carports and similar construction

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

- (a) at least two sides are completely open to the environment; and
- (b) the carport and adjacent *building* are under the same *ownership*; and
- (c) for a roof plan area of no more than 40 m², no part of the roof is closer than 0.3 m to a *relevant boundary*.

Table 5.1		Requirements for external wall claddings		
Column A	Column A	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 10m	Distance greater than or equal to 1.0 m and <i>building height</i> greater than 10m	
			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
Notes:				
Table 5.1 applies to separate <i>buildings</i> . It does not apply to <i>household units</i> within the same <i>building</i> whether they are side by side or one above the other.				

Figure 5.1: Fire rating of external walls
New Zealand Building Code Acceptable Solution C/AS3

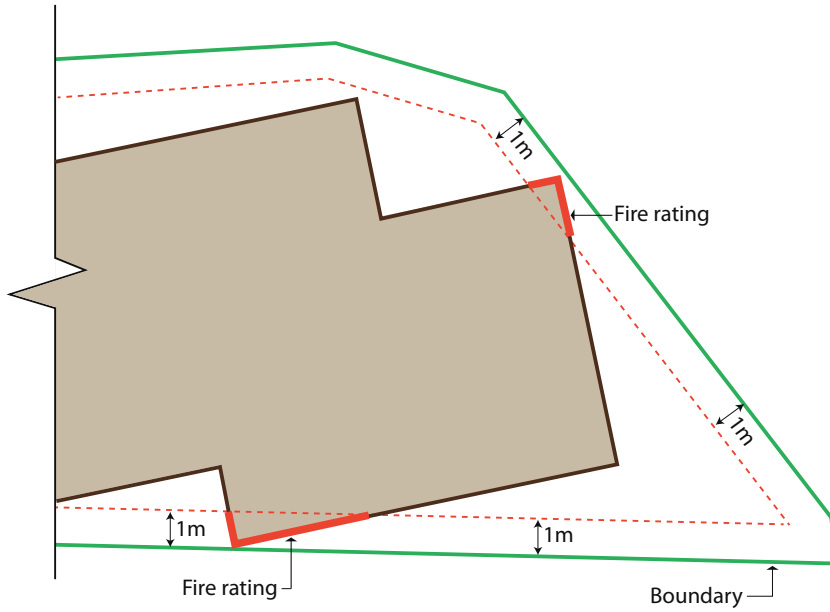
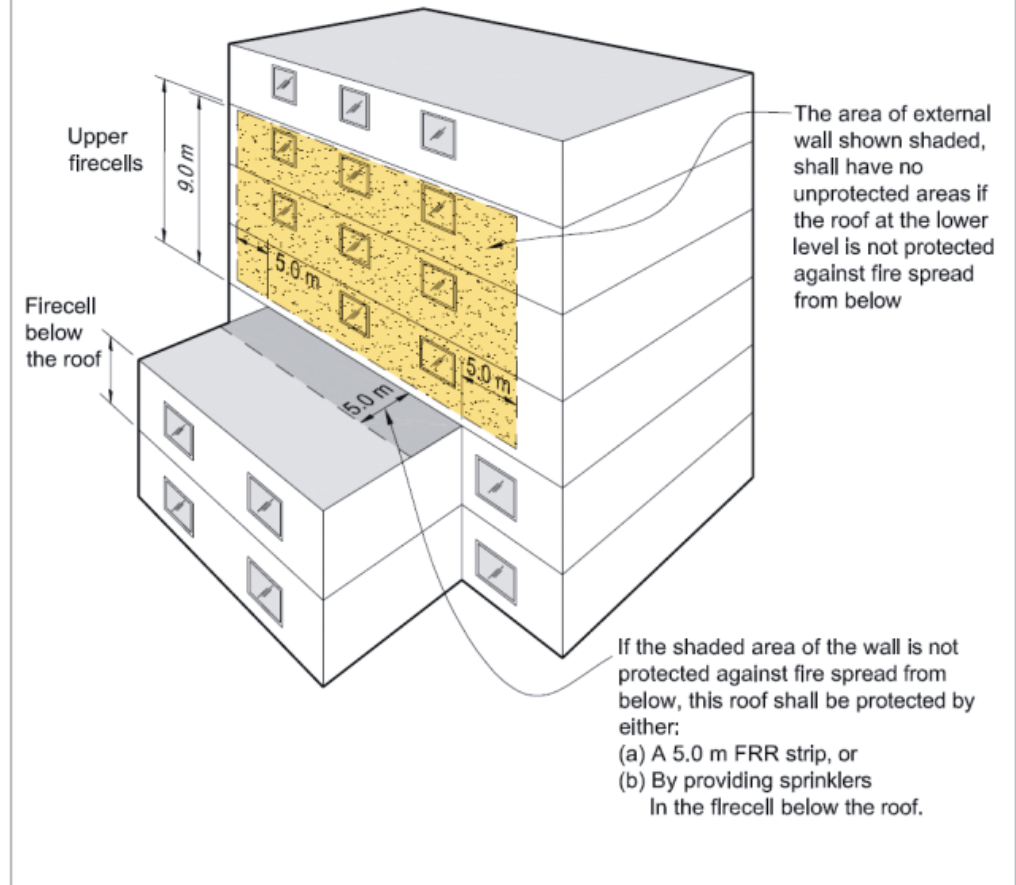


Figure 5.2: External walls and roof, vertical fire spread
 New Zealand Building Code Acceptable Solution C/AS3



Part 6: Firefighting

6.1 Fire Service vehicular access

6.1.1

If *buildings* that contain *multi-unit dwellings* with more than two 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:
 - (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*.

Part 7: Prevention of fire occurring

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 of this Standard 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 of this Standard 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 Paragraph 6.4 as follows:

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

7.3 Oil-fired appliances

7.3.1

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

7.3.2

Modifications to AS 1691

Delete Paragraph 2.2.3 and substitute the following:

“2.2.3 Electrical equipment

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

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

Delete the Note to Paragraph 3.1.2 (d).

Delete Paragraph 3.1.4 and substitute the following:

“3.1.4 Stability

The appliance shall be mechanically fixed to the *building*.

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

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

Delete the words “without specific approval” from Paragraph 3.2.8 (b).

Delete Paragraph 5.1.1.

Add a Note to Paragraph 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 Recessed luminaires

7.4.1

Recessed luminaires (downlights) 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 with this requirement can only be achieved if the luminaire is installed in accordance with AS/NZS 60598.2.2.

7.5 Open fires

7.5.1 Chimneys

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; and
- (b) *fireplace* joints of *non-combustible* material and shall be sealed against air leakage; and
- (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 (eg heavy-quality *building* paper) to prevent the grout filling from bonding with the *flue liner*.

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
 New Zealand Building Code Acceptable Solution C/AS1

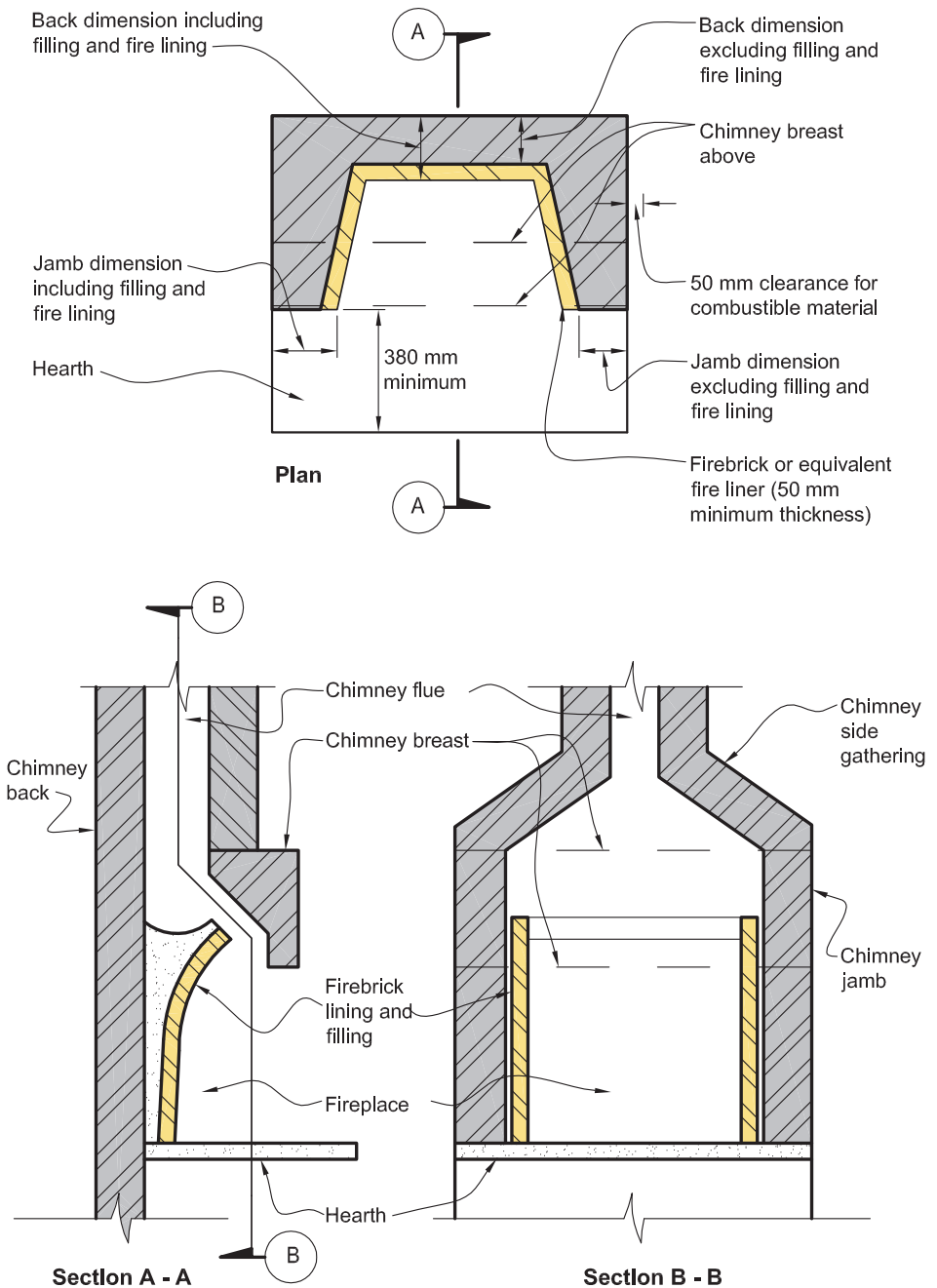
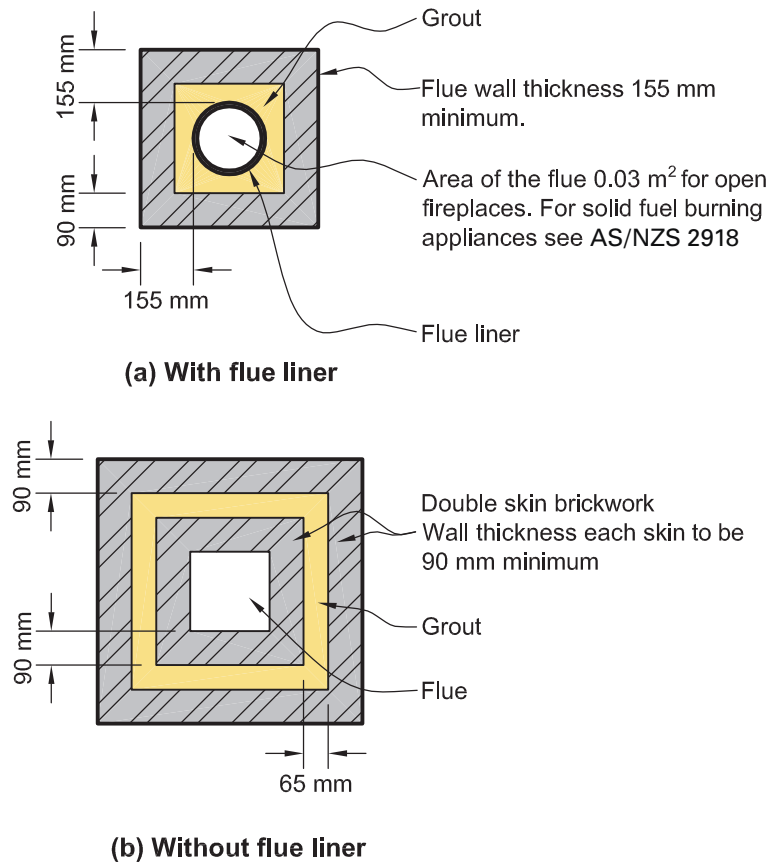


Table 7.1	Minimum acceptable deminsions of chimneys		
<i>Chimney construction</i>	<i>Chimney Jamb and chimney back thickness</i>		<i>Chimney breasts and side gathering, and chimney wall thickness above the level of the gather, excluding linings (mm)</i>
	Excluding filling and <i>flue liner</i> (mm)	Including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

Figure 7.2: Brick chimney flues – sections
New Zealand Building Code Acceptable Solution C/AS1



7.5.3

Flue linings shall be one of the following types:

- (a) clay flue liners with rebated or socketed joints; or
- (b) imperforate clay pipes with socketed joints; or
- (c) high alumina cement and kiln-burnt aggregate pipes, with rebated or socketed joints, or steel collars around joints.

The linings shall be fitted with the sockets or rebates uppermost to prevent condensate running out, and to prevent any caulking material from being 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)); or
- (b) ordinary concrete *chimneys*; or
- (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 made 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; and
- (b) extend no less than 230 mm on each side of the *fireplace* opening, and no less than 380 mm forward of the *fireplace* opening; and
- (c) have no combustible material closer than the clearances given in Paragraph 7.5.8 (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 shall be separated from *combustible* material by *insulating material* with a minimum service operating temperature of 150°C.

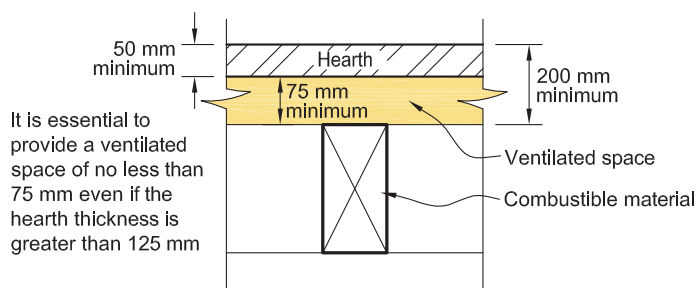
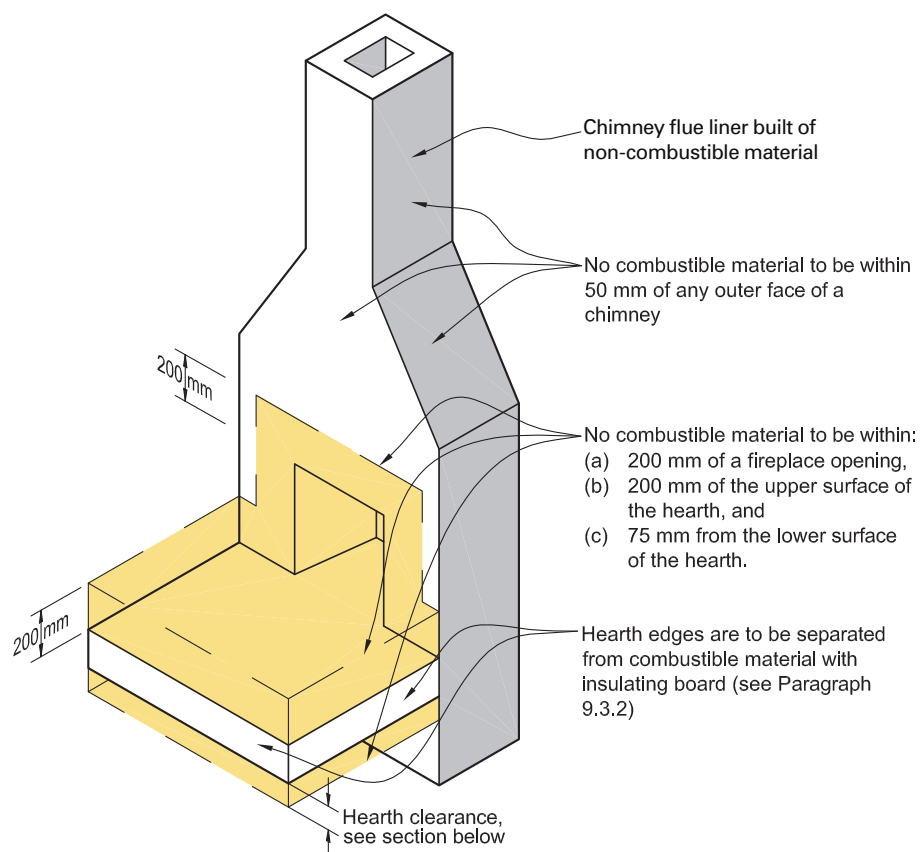
7.5.11

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

7.5.12

AS/NZS 2918 Sections 2 and 4 are also Acceptable Solutions for the installation of *flues* from open fires.

Figure 7.3: Clearances between chimney and hearth, and combustible materials
New Zealand Building Code Acceptable Solution C/AS1



Section showing minimum dimensions

APPENDICES

Appendix A (normative): *Fire safety systems*

A1.1 Fire alarm and sprinkler systems

A1.1.1

Fire alarm systems used in *fire safety systems* shall meet the requirements of Acceptable Solution F7/AS1. *Fire* sprinkler systems used in the *fire safety systems* shall, except where specified, also meet the requirements of Appendix B of this design guide.

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 how it is activated, shall be able to communicate with the Fire Service in accordance with Acceptable Solution F7/AS1/2.1.2(a) or (b).

Appendix B (normative): Fire sprinkler systems

B1.1 Introduction

B1.1.1

When sprinklers are required they shall comply with the relevant New Zealand Standard, amended as shown in Paragraphs B2.1 and B3.1 and B4.1.

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 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.

B4.1 Sprinkler systems for houses

B4.1.1

NZS 4517

Appendix C (normative): Test methods

C1.1 General

This Appendix contains test methods for confirming that specific *building elements* satisfy relevant provisions of this design guide. It includes both established *standard tests* and other test methods for *building elements* in situations where *standard tests* are unavailable.

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

C2.1 Flammability of floor coverings

C2.1.1

Materials shall be assigned a critical radiant flux either:

- (a) when tested to ISO 9239 Reaction to fire tests for flooring – Part 1: Determination of the burning behaviour using a radiant heat source, or
- (b) by reference to NZBC Verification Method C/VM2, Appendix B Table B1.

C3.1 Flammability of suspended flexible fabrics and membrane structures

C3.1.1

Materials shall be assigned a flammability index when tested to AS 1530 Methods for fire tests on *building materials*, components and structures – Part 2: Test for flammability of materials.

C4.1 Fire resistance

C4.1.1

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, components 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.

C4.1.2

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.

C5.1 Fire doors and smoke control doors

C5.1.1

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

C5.1.2 Smoke control doors

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 interruption by hardware is limited, 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 has signage identifying it as a *smoke control door* in accordance with Acceptable Solution F8/AS1.

C5.1.3 Frictional forces

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.

C5.1.4 Self-closing provision

All *fire* and *smoke control door* leaves shall be *self-closing*, and provision shall be made during commissioning for the *self-closing* device to be adjustable to meet the requirements of Paragraph C5.1.3 after installation.

C5.1.5

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 that activates in the event of *fire* but does not operate at other times.

C5.1.6 Automatic smoke-sensing devices

If used, automatic smoke-sensing devices complying with NZS 4512 shall be positioned within the stream of air that passes the door when the *smoke control door* is fully open.

C6.1 Fire properties of external wall cladding systems

C6.1.1

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).

C6.1.2

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
- (b) a 15-minute test
- (c) the total heat release shall be measured from the start of the test
- (d) the sample orientation shall be horizontal, and
- (e) the ignition shall be initiated by the external spark igniter.

C6.1.3

Timber claddings that have a *fire retardant* treatment incorporated in or applied to them shall undergo accelerated weathering described in ASTM D 2898 Method B with the water flow rate from Method A before being tested in accordance with the requirements of Paragraph C6.1.1.

C6.1.4

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 5.5.

C6.1.5

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 C6.1.2 without the metal facing present.

Appendix D: Forms

Form D1	Declaration: building owner
<p>I..... (full name of declarant)</p> <p>..... (position held, eg Chief Executive)</p>	
<p>of.....(company)</p> <p>..... (address)</p> <p>..... (address)</p> <p>..... (address)</p>	
<p>Hereby, solemnly and sincerely declare that I have personally taken reasonable steps to ensure that</p> <p>.....(service provider's name), has:</p> <p>(a) the current service provider has signed-off the Declaration - Service Provider (Form D2).</p> <p>(b) furthermore I shall take reasonable steps to ensure that these obligations are transferred to all and any future building owner.</p> <p>And I make this solemn declaration conscientiously believing the same to be true and by virtue of the Oaths and Declarations Act 1957.</p>	
<p>Declared at..... on this.....day of 20.....</p> <p>Before me..... (name)</p> <p>..... (signature)</p>	

Form D2	Declaration: service provider
<p>I..... (full name of declarant)</p> <p>.....(position held, eg business owner/Chief Executive)</p>	
<p>of.....(company)</p> <p>..... (address)</p> <p>..... (address)</p> <p>..... (address)</p>	
<p>Hereby, solemnly and sincerely declare that I have personally taken reasonable steps to ensure that</p> <p>..... (name of service provider's business), has audited management procedures and documented quality assurance processes to ensure that:</p> <p>(a) the documented management procedures are, and shall remain to be, adequate for the building's intended use, and</p> <p>(b) the service provider/s understand/s the documented management procedures, and</p> <p>(c) the service provider/s is/are working within the limitations of the documented management procedures.</p> <p>(d) furthermore I shall take reasonable steps to ensure that these obligations are transferred to all and any future service provider.</p> <p>And I make this solemn declaration conscientiously believing the same to be true and by virtue of the Oaths and Declarations Act 1957.</p>	
<p>Declared at..... on this.....day of 20.....</p> <p>Before me..... (name)</p> <p>..... (signature)</p>	

