



Dear Customer

Please find attached the July 2014 amendment to C/AS6 Acceptable Solution for Buildings used for High Level Storage and Other High Risk Purposes (Risk Group WS), 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/AS6, please make the following changes:

Section	Previous version	July 2014 amendment
C/AS6 Acceptable Solution for Buildings used for High Level Storage and Other High Risk Purposes (Risk Group WS)		
Title pages	Remove document history/status	Replace with new document history/status
References	Remove page 7/8	Replace with new page 7/8
Definitions	Remove pages 9/10, 13–16	Replace with new pages 9/10, 13–16
C/AS6 Parts 1 and 2	Remove pages 19–22, 25/26	Replace with new pages 19–22, 25/26
C/AS6 Part 3	Remove pages 35–38, 43–48, 51/52	Replace with new pages 35–38, 43–48, 51/52
C/AS6 Part 4	Remove pages 63/64, 71/72, 77–80	Replace with new pages 63/64, 71/72, 77–80
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MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

C/AS6

Acceptable Solution for Buildings used for High Level Storage and Other High Risk Purposes (Risk Group WS)

For New Zealand Building Code Clauses
C1-C6 Protection from Fire



Using this Acceptable Solution

The Ministry of Business, Innovation and Employment may amend parts of this Acceptable Solution at any time. People using this Acceptable Solution 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 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 Acceptable Solution. Classified uses of buildings are explained in the Building Code Clause A1.

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New Zealand Government

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Status of C/AS6

This Acceptable Solution C/AS6, for buildings used for high level storage and other high risk purposes (Risk Group WS), provides a means of compliance with the New Zealand Building Code Clauses C1-C6 Protection from Fire. It is issued under section 22 of the Building Act 2004 as an Acceptable Solution.

This Acceptable Solution is 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/AS6

This Acceptable Solution is effective from 1 July 2014. It can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire. It does not apply to building consent applications submitted before 1 July 2014.

The previous version, Amendment 2, of this Acceptable Solution can be used to show compliance with the Building Code Clauses C1-C6 Protection from Fire until 28 February 2015. It can be used for building consent applications submitted before 1 March 2015.

Document History		
	Date	Alterations
New document	Effective from 10 April 2012	C/AS6 is 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	pp. 7–8 References pp. 13–14 Definitions p. 22 1.3 p. 26 2.2.3 p. 38 Figure 3.7 p. 42 Figure 3.12 pp. 49 and 51 3.13.1 and 3.15.5 pp. 81–88 5.2.1, 5.3.2, 5.5.4, Figure 5.3, Table 5.2 p. 105 C4.1.2 and C5.1.1
Amendment 2	Effective from 19 December 2013 until 28 February 2015	p. 7 References pp. 10 and 15 Definitions pp. 20 and 22 1.1.1, 1.3, Table 1.1 p. 26 2.2.1 p. 29 2.2.8, 2.3.1 p. 34 3.3.2 p. 51 3.15.2 p. 60 4.4.4, 4.4.5 p. 67 4.13.5, 4.13.6 p. 77–79 4.16.11, 4.16.12, 4.17.1, 4.17.6 p. 97 7.2 p. 104 B2.1.1 pp. 105–106 C6.1.2
Amendment 3	Effective from 1 July 2014	p. 7 References p. 10, 14 and 15 Definitions pp. 20–22 1.1.1, 1.1.3, 1.3, Table 1.1 p. 25 Table 1.2 p. 26 2.2.1 pp. 35 and 37 3.3.2, Table 3.2 p. 43 3.7.13 pp. 46–48 3.10.2, 3.10.5, 3.11.5, Figures 3.17A, Table 3.4 p. 51 3.15.2 p. 63 4.10.3 p. 71 4.16.1 pp. 77–79 4.16.12, 4.17.2, 4.17.5, 4.18.1, Table 4.1 p. 82 5.3.1 p. 90 5.6.8 p. 105 C2.1, C4.1.2, C5.1.1 p. 109 Index

References

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

Standards New Zealand		Where quoted
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	C5.1.1
Part 22: 1987	Methods for determination of the fire resistance of non-loadbearing elements of construction	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>	3.10.5, 4.16.12 Table 2.1, A2.1.1
AS/NZS 2918: 2001	Domestic solid fuel burning appliances – installation	7.1.1, 7.1.2, 7.3.3, 7.5.5, 7.5.10 Comment, 7.5.12, Figure 7.2
NZS 4232:- Part 2: 1988	Performance criteria for fire resisting closures Fire resisting glazing systems	Definitions
NZS 4332: 1997	Non-domestic passenger and goods lifts	6.4.3
NZS 4510: 2008	Fire hydrant systems for buildings <i>Amend: 1</i>	Table 2.1, A2.1.1
NZS 4512: 2010	Fire detection and alarm systems in buildings	Table 2.1, 6.2.1, A2.1.1, C6.1.6
NZS 4515: 2009	Fire sprinkler systems for life safety in sleeping	Definitions, 6.2.1, B3.1.1
NZS 4520: 2010	Fire resistant doorsets	4.2.4, 4.16.6, C6.1.1
NZS 4541: 2013	Automatic fire sprinkler systems	Definitions, Table 2.1, 6.2.1, B2.1.1
AS/NZS 5601:- Part 1: 2010	Gas installation General installations <i>Amend: 1</i>	7.2.1, 7.2.2
Standards Australia		
AS 1366:- Part 1: 1992	Rigid cellular plastics sheets for thermal insulation Rigid cellular polyurethane (RC/PUR) <i>Amend: 1</i>	4.17.2
Part 2: 1992	Rigid cellular polyisocyanurate (RC/PIR)	4.17.2
Part 3: 1992	Rigid cellular polystyrene – moulded (RC/PS-M) <i>Amend: 1</i>	4.17.2
Part 4: 1989	Rigid cellular polystyrene – extruded (RC/PS-E)	4.17.2

Errata 1
Feb 2013

Amend 2
Dec 2013

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AS 1530:-	Methods for fire tests on building materials, components and structures	
Part 1: 1994	Combustibility test for materials	Definitions, C4.1.1
Part 2: 1993	Test for flammability of materials	4.17.8
Part 4: 2005	Fire-resistance tests of elements of building construction	4.5.9, C5.1.1
AS 1691: 1985	Domestic oil-fired appliances – installation	7.3.1, 7.3.2
AS 4072:-	Components for the protection of openings in fire-resistant separating elements	
Part 1: 2005	Service penetrations and control joints	C5.1.2
	<i>Amend: 1</i>	
Errata 1 Feb 2013		
International Standards Organisation		
ISO 5660:-	Reaction-to-fire tests – Heat release, smoke production and mass loss rate	
Part 1: 2002	Heat release rate (cone calorimeter method)	C4.1.2, C7.1.1, C7.1.2
Part 2: 2002	Smoke production rate (dynamic measurement)	C4.1.2
ISO 9239:-	Reaction to fire tests for flooring	
Part 1: 2010	Determination of the burning behaviour using a radiant heat source	4.17.3, Table 4.2, C2.1
Errata 1 Feb 2013		
ISO 9705: 1993	Fire tests – Full scale room test for surface products	C4.1.2
European Standards Organisation		
Errata 1 Feb 2013		
BS EN 12101:-	Smoke and heat control systems	
Part 1: 2005	Specification for smoke barriers	Definitions
Building Research Establishment (UK)		
BRE Defect Action Sheet DAS 131: May 1989	External walls: Combustible external plastics insulation: Horizontal fire barriers	5.7.18 Comment
BRE Report 135: 1988	Fire performance of external thermal insulation for walls in multi-storey buildings. Rogowski B.F., Ramaprasad R., Southern J.R.	5.7.18 Comment
National Fire Protection Association of America		
NFPA 285: 1998	Standard method of test for the evaluation of flammability characteristics of exterior non-load-bearing wall assemblies containing components using the intermediate scale, multi-storey test apparatus	5.8.2
American Society for Testing and Materials		
ASTM D 2898: 2010	Standard practice for accelerated weathering of fire-retardant-treated wood for fire testing	C7.1.3
New Zealand Legislation		
Fire Safety and Evacuation of Buildings Regulations 2006		Definitions
Hazardous Substances and New Organisms Act 1996		1.1.5

Definitions

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

Access route A continuous route that permits people and goods to move between the apron or *construction* edge of the *building* to spaces within a *building*, and between spaces within a *building*.

Accessible Having features to permit use by *people with disabilities*.

Accessible route An *access route* usable by *people with disabilities*. It shall be a continuous route that can be negotiated unaided by a wheelchair user. The route shall extend from street *boundary* or car parking area to those spaces within the *building* required to be *accessible* to enable *people with disabilities* to carry out normal activities and processes within the *building*.

Adjacent building A nearby *building*, including an adjoining *building*, whether or not erected on *other property*.

Basement Any *firecell* or part of a *firecell* below the level of the lowest *final exit*.

Comment:

Because *fire safety systems* are increased with increases in *escape height*, the precautions for *basements* increase with *basement* depth. Thus a single floor *building* with one *basement* level is treated as a two floor *building*, a single floor *building* with three *basement* levels as a four floor *building*.

Boundary means any *boundary* that is shown on a survey plan that is approved by the Surveyor-General and deposited with the Registrar-General of Land, whether or not a new title has been issued.

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

Comment:

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

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

Comment:

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

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

Building consent means consent to carry out *building* work granted by a *building consent authority* under section 49 of the *Building Act 2004*.

Building consent authority has the meaning ascribed to it by section 7 of the *Building Act 2004*.

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

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

Cavity barrier A *construction* provided to close openings within a *concealed space* against the passage of *fire*, or to restrict the spread of *fire* within such spaces.

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

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

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

Chimney jambs The side walls of a *fireplace*.

Combustible See *non-combustible*.

Concealed space Any part of the space within a *building* that cannot be seen from an *occupied space*.

Comment:

This term includes any ceiling space, roof space, space under a raised floor (such as computer rooms, floors, or stages), plenums, spaces under a tiered floor, "left-over spaces" created when some structural element or the like has been covered in; small service or duct spaces within the volume of a *firecell* and the like, but not a *protected shaft*.

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

Damper blade A component of a *fire damper* that closes off the airway within a *fire damper* upon detection of *fire* or smoke.

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

Comment:

A *dead end* ceases to exist where the *escape route* reaches a point in the *open path* which offers alternative directions of travel, or at a *final exit* or an *exitway*.

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

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

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

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

ECC does not include home based early childhood services.

Escape height The height between the floor level in the *firecell* being considered and the floor level of the required *final exit* which is the greatest vertical distance above or below that *firecell*.

Comment:

1. It is necessary only to use the greatest height to the exits required for the *firecell* being considered, even though the *building* may have other *final exits* at lower or higher levels.
2. Where the *firecell* contains *intermediate floors*, or upper floors within *household units* the *escape height* shall be measured from the floor having the greatest vertical separation from the *final exit*.

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

Comment:

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

Exitway All parts of an *escape route* protected by *fire* or *smoke separations*, or by distance when exposed to open air, and terminating at a *final exit*.

External wall Any exterior face of a *building* within 30° of vertical, consisting of *primary* and/or *secondary elements* intended to provide protection against the outdoor environment, but which may also contain *unprotected areas*.

Comment:

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

Amend 2
Dec 2013

Amend 3
Jul 2014

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 polychloropene 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.

Group sleeping area A *firecell* containing communal sleeping accommodation for a specified number of people who may or may not be known to one another. Partial subdivision within the *firecell* is permitted with specific limitation including that no *occupied space* is fully enclosed and all *occupied spaces* are open and available to all occupants at any time. A *group sleeping area firecell* may include spaces for associated direct support functions, such as hygiene facilities and tea making (not cooking) activities, for use by the occupants. It does not include spaces, such as waiting rooms, lounges, dining rooms or kitchens, providing a communal service function for all occupants.

Comment:

1. Examples of *group sleeping area firecells* are dormitories, hospital wards, *wharehenui*, backpacker hostels and ski lodges.
2. The maximum number of people permitted in a *group sleeping area firecell*, and the permitted form of subdivision, will depend on the ability of the occupants to react to the presence of *fire* and escape to a *safe place*.

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

Hazardous Creating an unreasonable risk to people of bodily injury or deterioration of health.

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*.

Hold-open device A device which holds a *smoke control door* or *fire door* open during normal use, but is released by deactivating the device by an automatic *fire* detection system, allowing the door to close automatically under the action of a self-closing device.

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.

Intended use In relation to a *building*,—

- (a) includes any or all of the following:
- (i) any reasonably foreseeable occasional use that is not incompatible with the *intended use*;
 - (ii) normal maintenance;
 - (iii) activities undertaken in response to *fire* or any other reasonably foreseeable emergency; but
- (b) does not include any other maintenance and repairs or rebuilding.

Intermediate floor Any upper floor within a *firecell* which because of its configuration provides an opening allowing smoke or *fire* to spread from a lower to an upper level within the *firecell*.

Comment:

1. Upper floors within *household units* need not meet the specific *fire* safety requirements which apply to *intermediate floors* in all other situations.
2. An *intermediate floor* may be open to the *firecell* or enclosed with non-*fire* rated *construction*. If enclosed with *fire* rated walls another *firecell* is created.
3. *Household units* occur only in *risk groups* SM and SH. Life safety provisions are governed by the limitations in permitted *open path* lengths.
4. *Risk groups* SM, SI, CA, WB, WS and VP allow limited area intermediate floors of 20% or 40% of the floor area depending on other fire safety requirements. In other situations C/VM2 is to be 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.

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

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

Comment:

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

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

Amend 3
Jul 2014

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

- a) dividing the total floor area by the m² per person (occupant density) for the activity being undertaken, or
- b) for sleeping areas, counting the number of sleeping (or care) spaces, or
- c) for fixed seating areas, counting the number of seats.

Comment:

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

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

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

Open space Open space means land on which there are, and will be, no *buildings* and which has no roof over any part of it other than overhanging eaves.

Other property Any land or *buildings* or part of any land or *buildings*, that are:

- a) not held under the same *allotment*; or
- b) not held under the same *ownership*; and includes a *road*.

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

- (a) means the *person* who—
 - (i) is entitled to the rack rent from the land; or
 - (ii) would be so entitled if the land were let to a tenant at a rack rent; and
- (b) includes—
 - (i) the *owner* of the fee simple of the land; and
 - (ii) for the purposes of Building Act sections 32, 44, 92, 96, 97, and 176(c), any person who has agreed in writing, whether conditionally or unconditionally, to purchase the land or any leasehold estate or interest in the land, or to take a lease of the land, and who is bound by the agreement because the agreement is still in force.

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

Comment:

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

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

Place of safety Place of safety means either—

- (a) a *safe place*; or
- (b) a place that is inside a *building* and meets the following requirements:
 - (i) the place is constructed with *fire separations* that have fire resistance sufficient to withstand *burnout* at the point of the *fire source*; and
 - (ii) the place is in a *building* that is protected by an automatic fire sprinkler system that complies with NZS 4541 or NZS 4515 as appropriate to the *building's* use; and
 - (iii) the place is designed to accommodate the intended number of persons; and
 - (iv) the place is provided with sufficient means of escape to enable the intended number of persons to escape to a *safe place* that is outside a *building*.

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*.

Protected shaft A space, other than a *safe path*, enclosed by *fire separations* or *external walls* used to house *building services*, lifts, or conveyors which pass from one *firecell* to another.

Railway line has the meaning ascribed to it by section 4 of the Railways Act 2005.

Amend 3
Jul 2014

Amend 2
Dec 2013

Relevant boundary Relevant *boundary* means the *boundary* of an *allotment* that is *other property* in relation to the *building* in question and from which is measured the separation between the *building* and that *other property*; and for the *external wall* of any *building*, the *relevant boundary* is the nearest of—

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

Comment:

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

Risk group The classification of a *building* or *firecells* within a *building* according to the use to which it is intended to be put.

Road This term has the meaning ascribed to it by section 315 of the Local Government Act 1974 and includes a public place and also includes a motorway.

Safe path That part of an *exitway* which is protected from the effects of *fire* by *fire separations*, *external walls*, or by distance when exposed to open air.

Part 1: General

CONTENTS

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

1.1 Introduction and scope

This Acceptable Solution can be used for establishing compliance with NZBC C1 to C6 Protection from Fire. It is one of a suite of Acceptable Solutions C/AS1 to C/AS7, each of them corresponding to a *risk group* (summarised in Table 1.1 and defined in Paragraph 1.1.1).

If the uses of a *building*, or part of a *building*, cover more than one *risk group*, one or more of these Acceptable Solutions may need to be followed to demonstrate compliance. Paragraph 1.2 explains how to determine the relevant *risk groups* for the *building* activities.

Notes shown under '**Comment**', occurring throughout this document, are for guidance purposes only and do not form part of this Acceptable Solution. Words in *italic* are defined at the front of this document. For ease of use, paragraphs, tables and figures containing similar information are allocated the same reference numbers in each of the Acceptable Solutions. If there is no corresponding information in a particular Acceptable Solution, the numbering is preserved by the notation:

1) "THIS PARAGRAPH DELIBERATELY LEFT BLANK"

2) "**This table not required for this Acceptable Solution**"

3) Figures are omitted without notification.

Appendices to this Acceptable Solution are part of and have equal status to this Acceptable Solution.

Comment:

It is recommended that the commentary document for Acceptable Solutions C/AS1 to C/AS7 be read in conjunction with this Acceptable Solution.

Table 1.1 Risk groups and Acceptable Solutions			
	Acceptable Solution	Risk group	Applies to
C/AS1	Buildings with sleeping (residential) and outbuildings	SH	Houses, townhouses and small <i>multi-unit dwellings</i> Outbuildings
C/AS2	Sleeping (non institutional)	SM	Permanent accommodation eg, apartments Transient accommodation eg, hotels, motels, hostels, backpackers, refuge shelters Education accommodation
C/AS3	Care or detention	SI	Institutions, hospitals (excluding special care facilities), residential care, rest homes, care in the community houses and homes, medical day treatment (using sedation), detention facilities (excluding prisons)
C/AS4	Public access and educational facilities	CA	Crowds, halls, recreation centres, public libraries (<2.4 m storage height), cinemas, shops, personal services (eg, dentists and doctors except as included above, beautician and hairdressing salons), schools, restaurants and cafes, <i>early childhood centres</i>
C/AS5	Business, commercial and low level storage	WB	Offices (including professional services such as law and accountancy practices), laboratories, workshops, manufacturing (excluding <i>foamed plastics</i>), factories, processing, temperature controlled storage (capable of <3.0 m storage height other than some limited areas in processing areas) and other storage <i>buildings</i> capable of <5.0 m storage height (except some limited areas <8.0 m to the apex), light aircraft hangars
C/AS6	High level storage and other high risks	WS	Warehouses (capable of ≥ 5.0 m storage height other than some limited areas, see C/AS5), temperature controlled storage (capable of ≥ 3.0 m storage height other than some limited areas, see C/AS5), trading and bulk retail (≥ 3.0 m storage height)
C/AS7	Vehicle storage and parking	VP	Vehicle parking – within a <i>building</i> or a separate <i>building</i>

Amends 2 and 3

Amend 3 Jul 2014

Amend 3 Jul 2014

Amend 3 Jul 2014

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.

Scope

1.1.1 The scope of this Acceptable Solution is restricted to *risk group* WS. This covers *buildings* or parts of *buildings* capable of storage of goods and other materials at a height of 3.0 m or more (warehouses with storage 5.0 m or more) and other spaces where there is a high *fire load* or the potential for fast *fire* growth. These include the following, provided they are no more than 20 storeys high (from ground level):

- a) Warehouses capable of storage over 5.0 m in height except storage *buildings* capable of storage of 5.0 m or greater but with a height to apex of less than 8.0 m and floor area of less than 4200 m² (see C/AS5)
- b) Supermarkets with shelving over 3.0 m
- c) Bulk retail and wholesalers with greater than 3.0 m storage height
- d) Temperature controlled storage with a stack height of more than 3.0 m except limited areas in processing buildings (see C/AS5).

Amend 2 Dec 2013

Amend 3 Jul 2014



Outside the scope of this Acceptable Solution

1.1.2 *Buildings* or parts of *buildings* in *risk groups* other than *WS* are outside the scope of this Acceptable Solution. Refer to Table 1.1 and use the corresponding Acceptable Solution instead.

Buildings with complex features are outside the scope of this Acceptable Solution and also of the Acceptable Solutions C/AS1 to C/AS7 corresponding to other *risk groups*. Verification Method C/VM2 shall be used instead. Complex features include:

- a) Atriums
- b) *Intermediate floors*, other than limited area *intermediate floors*
- c) Stadiums where tiered seating is provided for more than 2000 people or where the primary access for more than 100 people is above the level of the playing surface, and
- d) *Buildings* more than 20 storeys high.

Buildings that require specific *fire* engineering design (ie, those requiring design calculations and modelling) also fall outside the scope of Acceptable Solutions C/AS1 to C/AS7. If the Acceptable Solution cannot be followed in full, use Verification Method C/VM2 to demonstrate compliance.

1.1.3 This Acceptable Solution allows for an 'all out' evacuation strategy only and does not provide features that would allow for delayed evacuation strategies.

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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) If there is more than one *risk group* for a *firecell*, determine its primary *risk group* (see Paragraph 1.2.2: this is the one with the most onerous *fire* safety requirements).
- c) Apply this Acceptable Solution for any *firecell* in *risk group* *WS* by following steps 2 and 3.
- d) Then apply the relevant Acceptable Solutions for *firecells* with any other *risk groups* in the *building*.

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.

For Paragraph 1.2.1 Step 1 b), the most onerous *fire* safety requirements usually occur in Part 2: Firecells, *fire safety systems* and *fire* resistance ratings of each Acceptable Solution. *Buildings* or parts of *buildings* with sleeping occupancies generally have the most onerous requirements.

Amend 3
Jul 2014

Step 2: Determine the parameters for risk group WS

- a) Establish the relevant *building* measurements (these will include *building height*, floor plans, wall openings and distances to *relevant boundaries*).
- b) Work out the *occupant loads* for the relevant *building* spaces (refer to Paragraph 1.4).

Comment:
Applying the Acceptable Solution depends largely on the basic *building* measurements as above; therefore, this should be determined 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 *occupant loads* and on the *building's* dimensions and features where required.

Primary risk groups

1.2.2 If a *building* contains a number of different activities which individually may be categorised in different *risk groups*, the *risk group* designated for a particular *firecell* within a *building* shall be that of the primary *risk group*. The primary *risk group* shall be that one within the *firecell* that has the most onerous *fire* safety requirements.

1.2.3 Depending on the particular *building* and the uses or activities within that *building*, there may be several primary *risk groups*, with one or more on each floor.

Comment:
For example, levels of a multi-storey *building* may be categorised in different *risk groups* such as:

Basement carparks	VP
Shopping floors	CA
Office floors	WB
Domestic accommodation	SM

A single floor may also contain several *risk groups* such as:

Offices	WB
Shops	CA
Cafeteria	CA

1.3 Alterations and changes of use to buildings

If this Acceptable Solution is the basis of compliance of *building work* relating to an *alteration*, addition or change of use of an existing *building*, the *building work* shall comply fully with this Acceptable Solution.

Comment:
Sections 112 and 115 of the Building Act require the *means of escape from fire* of an existing *building* being altered, or the use being changed, to comply as nearly as is reasonably practicable with the Building Code.

Parts 1, 2, 3, and 4 of this Acceptable Solution may be used for an assessment of the *means of escape from fire* of an existing *building* that is being altered, to meet the requirements of section 112 of the *Building Act*.

Parts 1, 2, 3, and 4 of this Acceptable Solution may be used for an assessment of the *means of escape from fire*, and Part 5 for the assessment of *fire* rating performance, where an existing *building* is undergoing a change of use, to meet the requirements of section 115 of the Building Act.

The extent of assessment of the *means of escape from fire* of an existing *building* should follow the guidelines issued by MBIE “**Requesting information about means of escape from fire for existing buildings**”. This considers a number of risk factors including:

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

An existing *building* with a high *risk score* from the guidelines should be assessed against all of the *building* systems and features specified in Parts 1, 2, 3 and 4 of this Acceptable Solution, or alternatively be assessed using Verification Method C/VM2.

Sections 112 and 115 of the *Building Act* require the existing *building* to comply with other parts of the Building Code to at least the same extent as before the *alteration* or addition.

Amend 2
Errata 1

Amend 2
Dec 2013

Amend 2
Dec 2013

Amend 3
Jul 2014



1.4.3 Duplication shall be avoided by:

- a) Ensuring that, where people may be involved in more than one activity, they are counted only once, and
- b) Not including an *occupant load* for areas such as *exitways*, lift lobbies or sanitary facilities that are used intermittently by people already counted elsewhere in the *building*.

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1.4.5 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Justification for exceptions

1.4.6 If in a particular situation the *occupant load* derived from Table 1.2 is clearly more than will occur, the basis of any proposal for a lesser *occupant load* shall be substantiated to the *building consent authority*.

Comment:

This may make it possible to reduce the *occupant load* to below a trigger point for a *fire safety system*. However, note that designing a *building* for a reduced *occupant load* can severely restrict future occupancy options and may involve significant expense in meeting the *means of escape from fire* provisions for increased numbers.

1.4.7 If the maximum *occupant load* is greater than that calculated from Table 1.2, the higher number shall be used as the basis for the *fire safety design* and will need to be justified to the *building consent authority*.

Table 1.2		Occupant densities for risk groups WS
Activity	Occupant density (m²/person)	
Aircraft hangars	50	
Bulk retail (trading stores, supermarkets etc)	5	
Building supplies	10	
Bulk storage, including racks and shelves (no public access)	100	
Call centres	7	
Commercial laboratories, laundries	10	
Computer server rooms	25	
Heavy industry	30	
Interview rooms	5	
Commercial kitchens	10	
Manufacturing and process areas	10	
Meeting rooms	2.5	
Offices	10	
Personal service facilities	5	
Reception areas	10	
Workrooms, workshops	5	
Staffrooms and lunchrooms	5	
Boiler rooms, plant rooms	30	
Parking <i>buildings</i> , garages	50	

Amend 3
Jul 2014



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 *Firecells* in this *risk group* shall be sprinklered. Except when *risk groups* require subdivision or other area limitations are imposed by this Acceptable Solution, the *firecell* floor area may be unlimited.

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2.1.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

2.2 Fire safety systems

2.2.1 The *fire safety* systems for *firecells* required for this *risk group* shall be as follows. *Fire safety system* types shall be as defined in Table 2.1. If automatic heat or smoke detection systems are provided in addition to the requirements of this paragraph, a direct connection to the Fire Service is not required.

Amend 3
Jul 2014

For ≤1000 people:

- a) Type 6 alarm system, and
- b) Type 18 *building fire* hydrant system in all cases where the height from the Fire Service attendance point to any floor is greater than 15.0 m. Otherwise, a Type 18 system is required unless the Fire Service hose run distance from Fire Service vehicular access to any point on any floor is less than 75 m.

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For >1000 people:

- a) Type 7 sprinkler and alarm system, and
- b) Type 18 *building fire* hydrant system in all cases where the height from the Fire Service attendance point to any floor is greater than 15.0 m. Otherwise, a Type 18 system is required unless the Fire Service hose run distance from Fire Service vehicular access to any point on any floor is less than 75 m.

Amend 3
Jul 2014

Amend 2
Dec 2013

2.2.2 THIS PARAGRAPH DELIBERATELY LEFT BLANK

- h) **Intermediate floors:** for *firecells* containing an *intermediate floor*, both the vertical and horizontal parts of the *open path escape route* shall be wide enough to take the full *occupant load* from all contributing *occupied spaces*.
- i) **Vertical safe paths widths:** Vertical *safe paths* shall have minimum widths at any point determined only by the largest total *occupant load* passing that point in the direction of escape from:
- i) any single level (where not part of an *intermediate floor firecell*).
 - ii) all levels in a *firecell* where it spans more than one level (i.e. *intermediate floors*).

Amend 3
Jul 2014

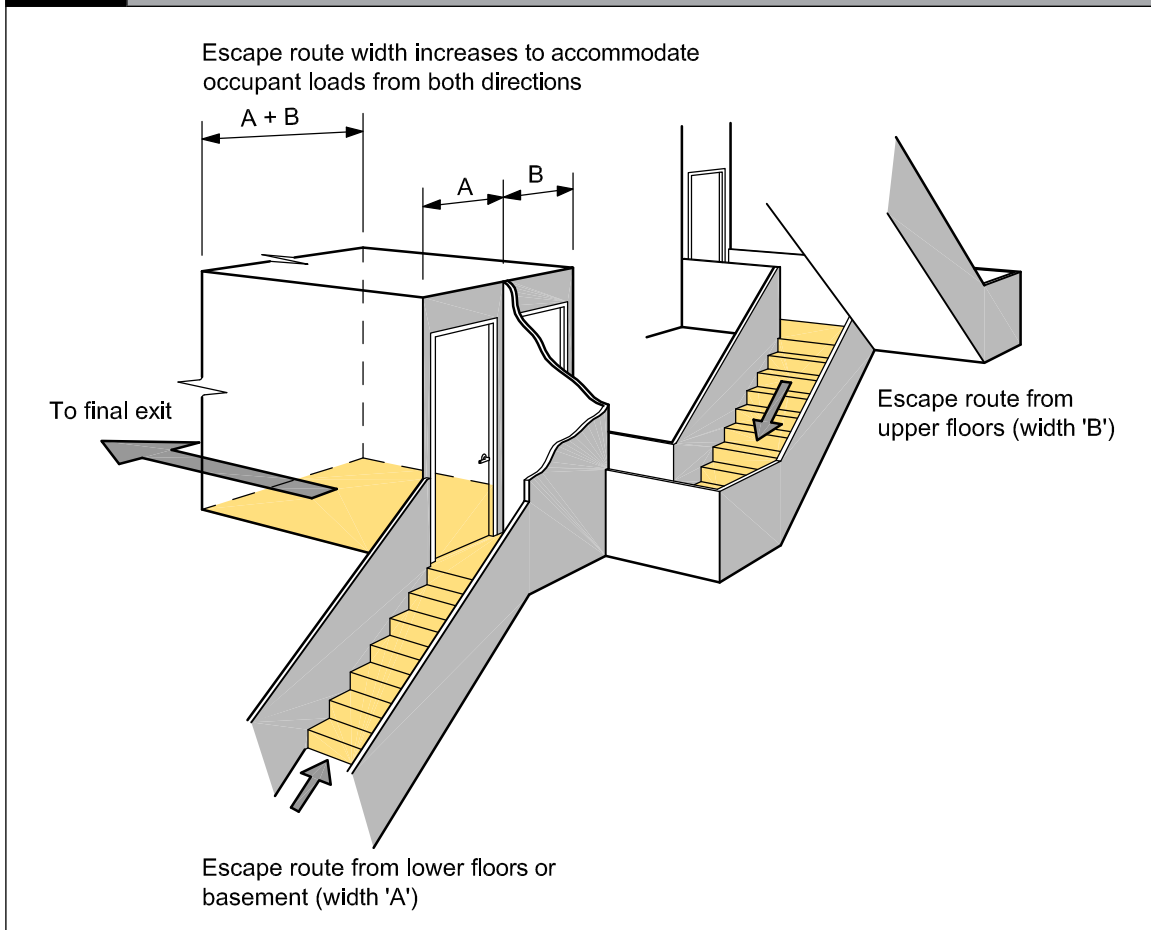
Comment:

1. A stair may have more than one *firecell* entering it at any level. Here the combined occupancy entering the stair from all *firecells* should be used.
2. In vertical *safe paths* it is not necessary to provide for cumulative *occupant load* as the *escape route* passes each floor level provided those floor levels are separate *firecells*.

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Jul 2014

- j) DELIBERATELY LEFT BLANK
- k) **Basements:** if an *escape route* from upper floors is joined at the level of a *final exit* by an *escape route* from a *basement* or lower floors, the *escape route* width at the point they combine shall be increased to accommodate the *occupant loads* from both directions (see Figure 3.5).
- l) **Ladders:** the width requirements of Paragraph 3.3.2 b) do not apply to ladders where their use is permitted in this Acceptable Solution.
- m) DELIBERATELY LEFT BLANK

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



Handrails and limitations to stairway widths

3.3.3 For safe evacuation on stairs, all *stairways* shall have at least one *handrail*.

Furthermore:

- a) *Stairways* in *escape routes* wider than 1500 mm shall have *handrails* on both sides, and
- b) *Stairways* in *escape routes* wider than 2000 mm (see Figure 3.6) shall also be provided with intermediate *handrails* which are equally spaced and which provide a width not greater than 1500 mm for each section of the *stairway*.

Comment:

Acceptable Solution D1/AS1 requires all *stairways* to have at least one *handrail*, and also requires *accessible* stairs to have *handrails* on both sides.

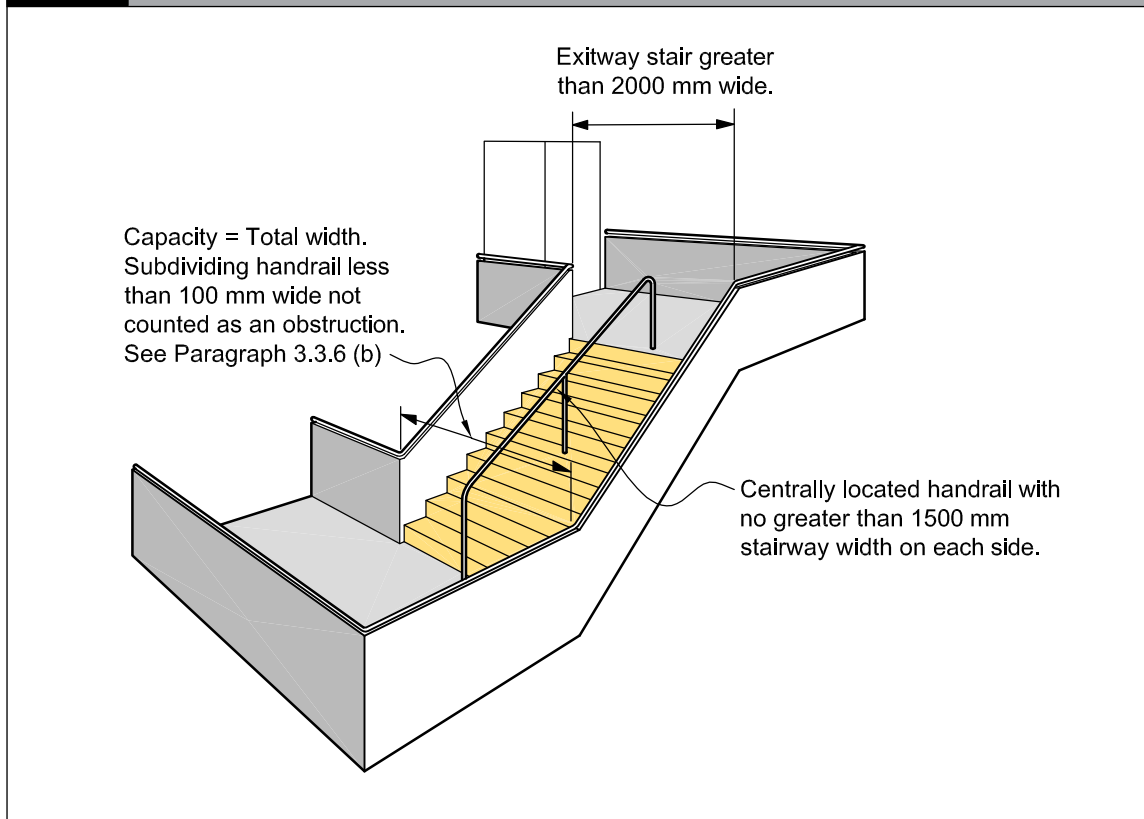
3.3.4 If the *escape height* exceeds 35 m, no more than 1500 mm shall be credited to the width of any *stairway* when calculating *stairway* capacity for an *escape route*.

Comment:

While the *stairway* may be wider than 1500 mm, this is the maximum width that can be used for calculating *stairway* capacity. You may need to provide additional *exitways* to carry the *occupant load*.

3.3.5 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Figure 3.6 Limitations to stairway widths
Paragraph 3.3.3 b)



Obstructions

3.3.6 Except as permitted by Paragraph 3.15.7, *escape routes* shall not be obstructed by access control systems such as revolving or automatic sliding doors, chains, turnstiles, sliding bars, crowd control barriers or similar devices.

The following minor obstructions are acceptable within the width of an *escape route*.

- a) **Minor projections** complying with the requirements of Acceptable Solution D1/AS1 such as signs, switches, alarm sounders and similar projections.
- b) **Handrails** complying with Acceptable Solution D1/AS1, projecting no more than 100 mm into the width, and *handrails* subdividing wide *stairways* that reduce the width by no more than 100 mm (see Paragraph 3.3.3), and
- c) DELIBERATELY LEFT BLANK
- d) **Door assemblies** which reduce the width of an *exitway* by no more than 125 mm when the door is fully open (see Figure 3.22).

Comment:

The 125 mm obstruction allows for projecting parts of the door frame assembly, the thickness of the door when open and similar acceptable obstructions.

3.4 Length of escape routes

3.4.1 An *escape route* may be any length, but:

- a) The lengths of *dead ends* and total *open paths* shall not exceed the distances given in Table 3.2, adjusted as necessary for:
 - i) reductions on *intermediate floors* (see Paragraph 3.4.3), and
 - ii) reductions on stairs and ladders (see Paragraph 3.4.4), and
- b) If the distance to the *final exit* exceeds the allowable length for the total *open path*, the remainder of the *escape route* shall be a *safe path*. (See Paragraph 3.9.7 for *safe path* length restrictions within a single floor level.)

Table 3.2 Travel distances on escape routes for risk group WS		
	Type 6 system	Type 7 system
<i>Dead end open path</i>	50 m	75 m
<i>Total open path</i>	120 m	180 m
If smoke detection systems are installed in order to extend permissible <i>travel distance</i> in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire Service connection is not required.		

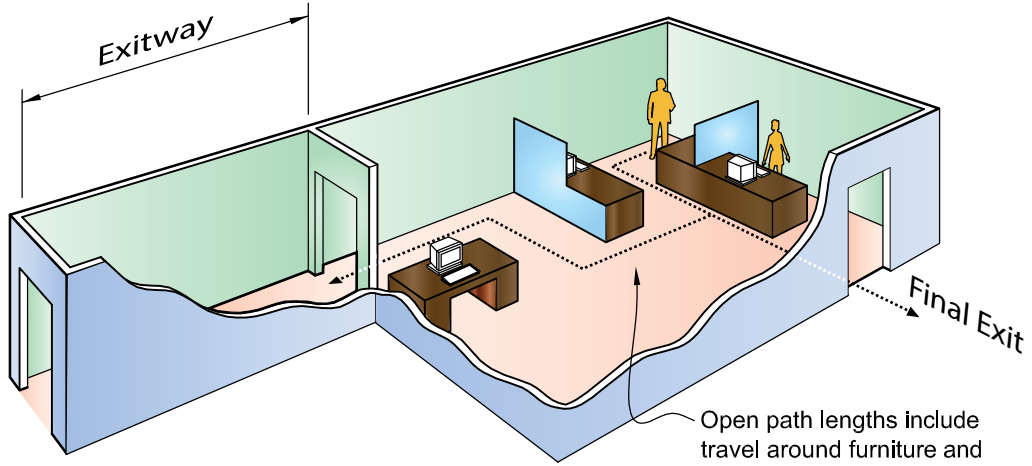
Amend 3
Jul 2014

Open paths

3.4.2 When determining *open path* lengths, including any *dead end*:

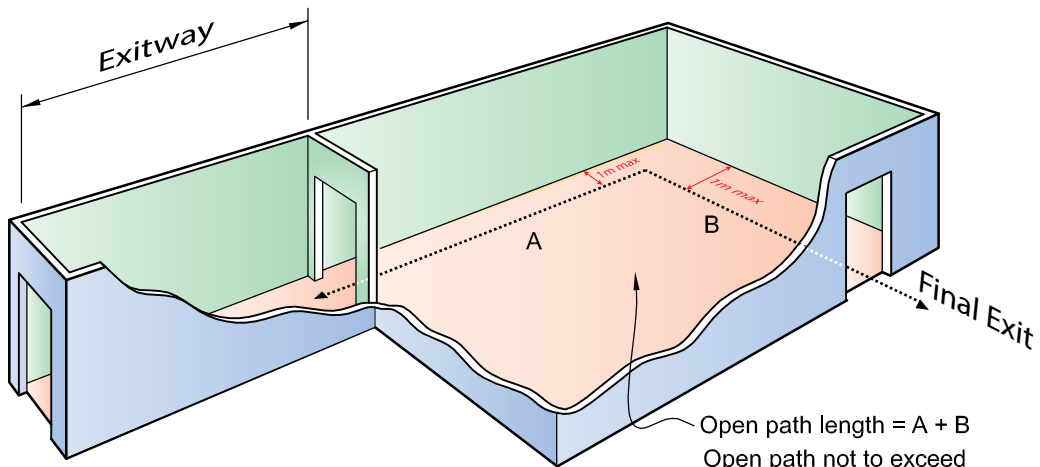
- a) **Start point:** the length shall be measured from no more than 1.0 m from the most remote point in a space.
- b) **Multiple risk groups:** the lengths in Table 3.2 shall apply to *risk group WS*. When other *risk groups* with different allowable maximum *open path* lengths use the same *open path*, the *risk group* with the shortest maximum length shall apply.
- c) **Furniture/fittings:** allowance shall be made for the *travel distance* around obstructions such as furniture, fittings and racking located in the *open path* (see Figure 3.7 a). If the location of such obstructions is not known, then the allowable *travel distance* shall be taken as the length plus the width of the space (see Figure 3.7 b).
- d) **Multiple escape routes:** if two or more *escape routes* are required, *open path* lengths from any point on a floor to no fewer than two exits from the *firecell* shall not exceed the lengths specified in Table 3.2.
- e) DELIBERATELY LEFT BLANK
- f) **Termination:** an *open path* ends either at:
 - i) the start of an *exitway*, or
 - ii) at a *final exit*, or
 - iii) the point where the *escape route* passes into an adjacent *firecell* on the same level (see Paragraph 3.7.13).

Figure 3.7 Length of open paths
Paragraph 3.4.2 c)



Each person shall have at least two escape routes available unless exempted by Paragraph 3.4

(a) FIXTURE AND FITTING POSITIONS KNOWN



(b) FIXTURE AND FITTING POSITIONS UNKNOWN

Errata 1
Feb 2013

- a) A distance of at least 8.0 m, or
- b) *Smoke separations* and *smoke control doors*.

Comment:

If this separation or protection is not provided, the length of the *open path* is limited to that of a *dead end*. This is critical in planning single *stairway buildings*, as the *stairway* must be positioned within the *dead end travel distance* limits.

3.6.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

3.7 Special cases of open paths

Ramps

3.7.1 Where stairs are not used, changes in level on an *escape route* shall be formed as ramps and shall comply with Acceptable Solution D1/AS1.

Separate tenancy

3.7.2 *Open paths* shall only pass through spaces containing different tenancies only if doors leading to an *exitway* or *final exit* can be readily opened by all persons for whom the *open path* is their *escape route*.

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3.7.4 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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TABLE 3.3: This table is not required for this Acceptable Solution.

Passing into an adjacent firecell

3.7.13 If an *open path* passes through a number of *fire separations* it is permitted to continue as the same *open path* provided the cumulative *travel distance* does not exceed the permitted distance specified in Table 3.2.

An *open path* may pass into an adjacent *firecell* on the same level (see Figure 3.15) and recommence as a new *open path* provided that:

- a) All *firecells* on the *escape route* have no fewer than two directions of escape, separated as required by Paragraph 3.6.2, and
- b) Adjacent *firecells* into which evacuation may take place have a floor area sufficient to accommodate not only their own occupants, but also the occupants from the adjacent *firecell*. This shall be calculated on the basis of the *occupant load* of the two *firecells*, and
- c) Each *firecell* has at least one other *escape route* independent of the route into the adjacent *firecell*. This other route may be by way of a *final exit* or via a third *firecell* provided that the exit from that third *firecell* is independent of exits from the other two *firecells*, and
- d) The *escape route* does not pass through more than three *fire separations* before entering an *exitway* or *final exit*, and
- e) The *escape route* width meets the requirements of Paragraph 3.3.2 for the *firecell* on the *escape route* that has the greatest *occupant load*.

Comment:

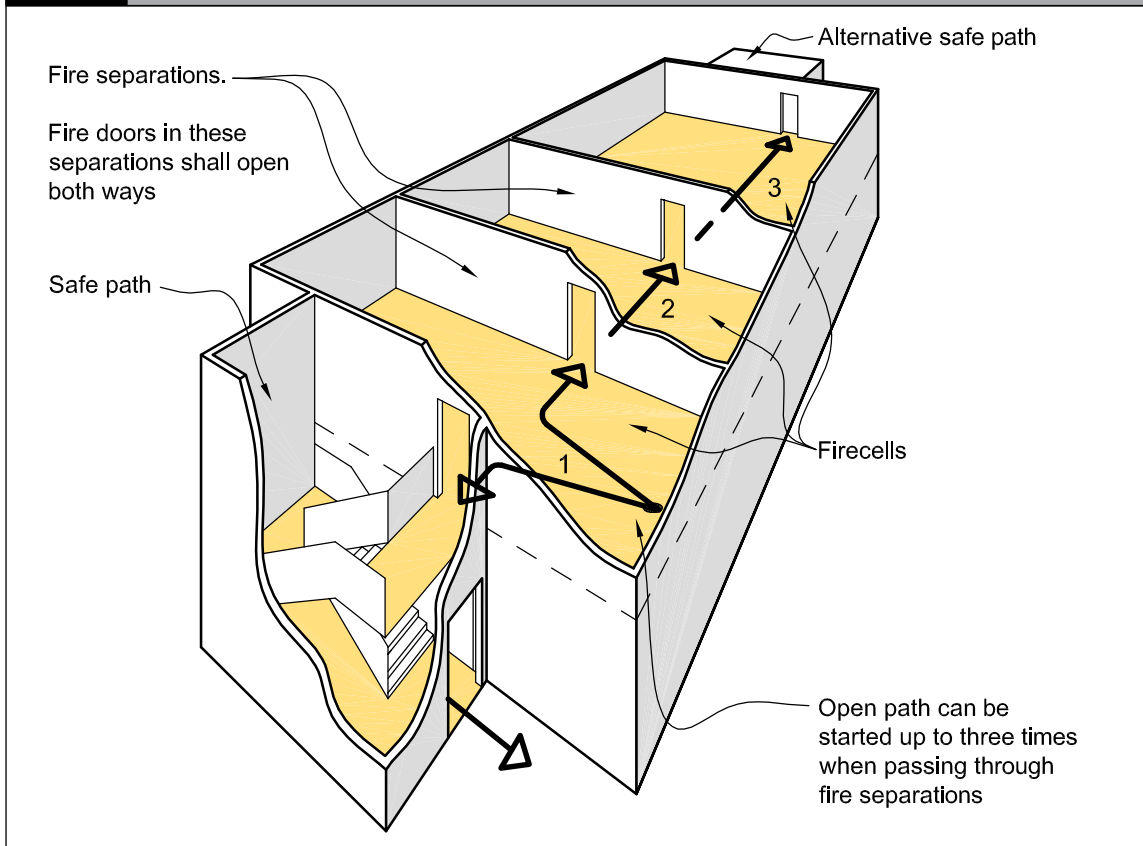
Open path lengths in each *firecell* are controlled by the requirements of Paragraph 3.4.2 for that *firecell*.

Refer to Paragraph 3.15.3 to determine whether doors between *firecells* need to be hung to swing both ways because escape may be in either direction, and Paragraph 3.15.9 for *hold-open device* requirements.

Amend 3
Jul 2014



Figure 3.15 Open path passing into adjacent firecells
Paragraphs 3.7.13 and 4.16.9



Escape via an intermediate floor

3.7.14 An *open path* may pass from a *firecell* on to an *intermediate floor* and recommence as an *open path* provided that:

- Where two or more *escape routes* are required from that *firecell*, only one *escape route* shall be via the *intermediate floor*, and
- The *intermediate floor* is served by at least two *escape routes*, separated as required by Paragraph 3.6.2, and terminating at separate *firecells*, *exitways* or *final exits* at the same level as the *intermediate floor*, and
- The *intermediate floor open path* lengths shall not exceed the requirements of Paragraph 3.4.

3.8 Dead ends

No more than 50 occupants

3.8.1 A *dead end* shall not serve an *occupant load* greater than 50.

Ladders

3.8.2 The *escape route* from a *dead end* may be a ladder complying with Acceptable Solution D1/AS1 if it serves only support activities or provides the same function in support of other *risk groups*, and only if the *occupant load* does not normally exceed four. Ladders are not permitted as *escape routes* in any other circumstances (see also Paragraph 3.4.4).

Comment:

This provision is principally for catwalks used intermittently in industrial plants and similar situations.

3.9 Exitways

3.9.1 Exitways consist of *smoke lobbies* and *safe paths*.

Smoke lobby floor area

3.9.2 If a *smoke lobby* is required preceding a vertical *safe path* (see Paragraph 3.5.1 and Figure 3.16), its floor area shall be calculated for the *occupant load* using that *smoke lobby* by assuming that:

- a) Part of the *occupant load* will be accommodated in the *stairway* vertical *safe path* between the level being considered and the next level in the direction of escape, with the remaining occupants accommodated in the *smoke lobby*, and
- b) The occupant density for calculating the required holding area is 0.25 m² per person. In the *stairway* the floor area shall be taken as the area of the first landing, plus the plan area of the flights of stairs between the two floor levels, plus the areas of any intermediate landings. Additional space shall be provided for door swings.

Comment:

This paragraph does not call up a requirement for a *smoke lobby*, but when they are required by other parts of this Acceptable Solution, this paragraph states how *smoke lobbies* are to be sized.

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Safe paths

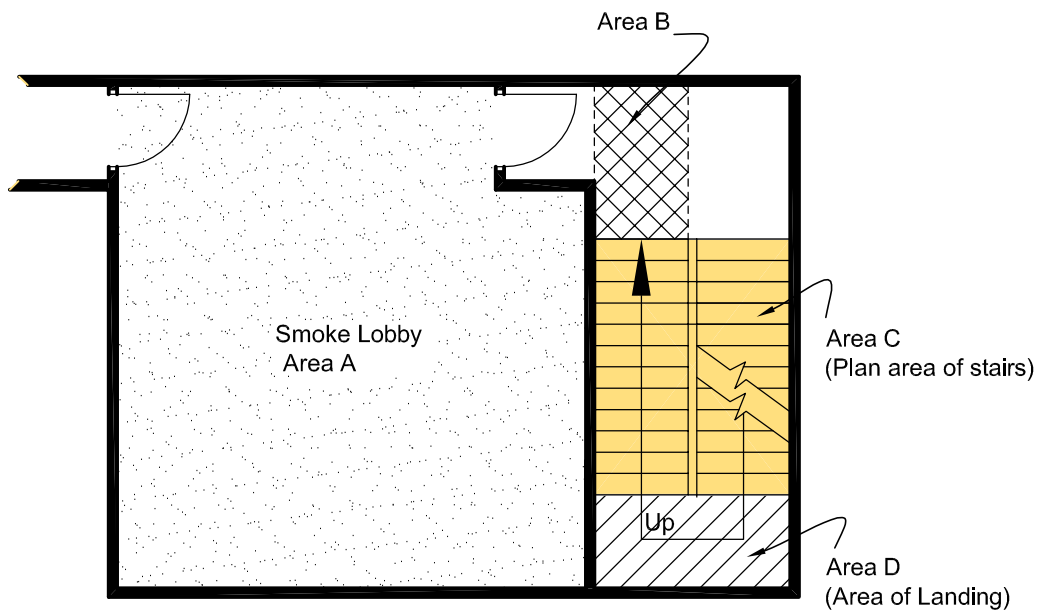
3.9.4 *Escape routes* from *firecells* shall enter directly into a *safe path* or *final exit*, except where Paragraph 3.7.13 permits *open paths* to continue from one *firecell* to another.

3.9.5 *Safe paths* shall be separated from each other, and from all spaces by:

- a) *Fire separations*, or
- b) If they are external to the *building*, by distance or by appropriate *construction* (see Paragraph 3.11).

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Figure 3.16 Sizing of smoke lobbies
Paragraph 3.9.2



Size of smoke lobby (Area A) required =
 Number of persons to be accommodated x 0.25 minus (Area B + Area C + Area D)

Safe path length restrictions

3.9.7 There is no limit on the length of a vertical *safe path*. Horizontal *safe paths* shall be no longer than specified in Table 3.4.

Table 3.4 Travel distances on horizontal safe paths		
	Type 6 system	Type 7 system
Single direction	50 m	75 m
Two or more directions	Unlimited	Unlimited
<p>If <i>open path</i> length increases for smoke detectors are being applied, where Acceptable Solution F7/AS1 allows heat detectors to be substituted for smoke detectors, not less than 70% of the <i>firecell</i> shall be protected with smoke detectors. It is not permitted to substitute the smoke detection in <i>exitways</i>.</p> <p>If smoke detection systems are installed in order to extend permissible <i>travel distance</i> in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire Service connection is not required.</p>		

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Safe path termination

3.9.8 Horizontal *safe paths* shall terminate at any of the following:

- The entrance to an internal *stairway* which is a separate *safe path*, or
- An external balcony leading to either an open or enclosed *stairway*, or
- An opening in an *external wall* which enters on to a bridge leading to an open or enclosed *stairway*, or
- A *final exit*.

Comment:

Long *safe path* corridors may be required to be subdivided by *smoke separations* (see Paragraph 4.12).

Safe path separation, glazing and smoke separation

3.9.9 The vertical and horizontal portions of internal *safe paths* shall be separated at every floor level by *fire separations* and *fire doors* with smoke control capability.

3.9.10 Glazing in *safe paths* shall comply with the requirements of Paragraph 4.2.

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3.10 Control of exitway activities

3.10.1 *Exitways* shall not be used for:

- any storage of goods, solid waste or solid waste containers, or
- for entry points to solid waste chutes, or
- the location of furniture or other *combustibles*, or
- storage of cloaks or linen, or
- a cleaner's cupboard not *fire separated* from the *exitway*, or
- the location of an electrical switchboard or similar, or
- any activity (other than as permitted by Paragraph 3.10.2).

3.10.2 Some activities are permitted in an *exitway* if:

- An alternative *escape route* is available from all *firecells* served by the *safe path* in which the activities occur, and
- For *building occupant loads* up to 500 a Type 4 system is installed, and for *occupant loads* exceeding 500 a Type 7 system is installed. These systems shall be installed in the *exitway* and connected to alerting devices installed throughout the *building*, and
- The *escape route* is not impeded by the activity or the occupants involved in that activity, and
- Those activities:
 - are visible to users of the *exitway*, except in the case of *sanitary fixtures*
 - exist only to provide support functions to the activities of the *risk group* served by the *exitway*
 - occupy a total floor area of not more than 6.0 m².

Comment:

Permitted activities include but are not limited to a reception counter (but not an associated office), and toilet facilities.

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Lifts

3.10.3 A passenger lift, but not a goods lift, may be located in a vertical *safe path* containing a *stairway* provided the following conditions are satisfied:

- a) The lift shaft and all its openings are located entirely within a single *firecell* containing the vertical *safe path*, and
- b) Passenger access into and from the lift takes place entirely within the *safe path*, and
- c) No other activity occurs within the vertical *safe path*, and
- d) The lift machine room is a separate *firecell*, and the openings for lift ropes through the *fire separation* are as small as practicable, and any *penetrations*, such as for electrical cables, are *fire stopped*. (See Paragraph 4.4 for *fire stopping*.)

3.10.4 Lift door requirements shall be as specified in Paragraphs 4.16.3 and 4.16.11.

3.10.5 In situations not described in Paragraphs 3.10.3 or 3.10.4 lift landings in unsprinklered *buildings* shall either open into a *smoke lobby* or the lift shaft shall be provided with a pressurisation system designed to AS/NZS 1668.1. Any *smoke lobby* shall not be part of the horizontal *safe path* (i.e. the horizontal *safe path* shall not pass through the *smoke lobby*). See Figure 3.17A.

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3.11 External escape routes

3.11.1 If an *escape route* enters a space exposed to the open air (e.g. an open *stairway*, a balcony, across a roof or a ground level path), it shall meet the requirements of a *safe path* between that point and the *final exit*. *Safe path* separation requirements shall be achieved by providing either distance or *fire rated construction* between the *escape route* and adjacent *firecells*, as specified in Paragraphs 3.11.2 to 3.11.6.

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Comment:

Balconies with one direction of escape comply with the requirements of a *safe path* if the *external wall* beside the balcony has no *unprotected areas* or if the balcony is large enough to allow separation by distance from the *external wall* (see Paragraph 3.11.2). Balconies with two directions of escape from all *firecell* exits are also considered to be *safe paths*, even if the adjacent *external wall* has 100% *unprotected area*.

Separation by distance

3.11.2 Separation by distance shall be achieved by:

- a) Locating the *escape route* no less than the distance required by Paragraph 3.11.3 from *external walls* (see Figure 3.18), or
- b) Locating the *escape route* so that it diverges from *external walls* (see Paragraph 3.11.5 a)), or
- c) Providing alternative directions of escape from the point where the *escape route* passes through an *external wall* and becomes an *external escape route* (see Paragraph 3.11.5 b)).

3.11.3 If there is only one direction of escape, roofs and *external walls* shall have no *unprotected areas* closer to an external *escape route* than 1.0 m as all *firecells* passed by the *external escape route* are sprinklered.

Comment:

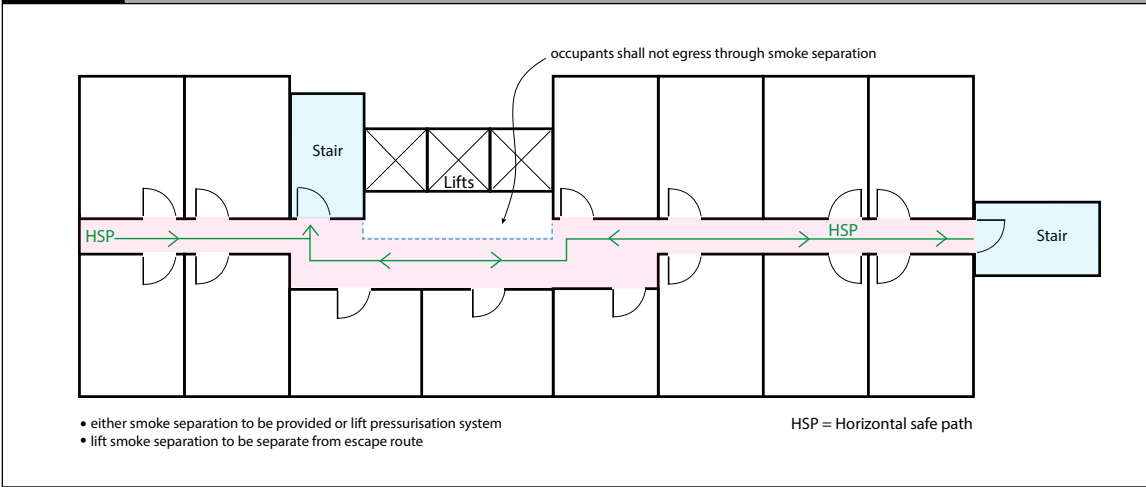
This provision is to limit heat radiation exposure to occupants who have only one direction of escape. Therefore, the limiting distances apply horizontally to both sides of the *escape route*.

3.11.4 If the distance separating *external walls* or roofs from an external *dead end escape route* is less than 1.0 m, those walls and roofs shall comply with the *FRR* requirements of Paragraph 5.3. Glazing shall comply with Paragraph 4.2 and the *FRR* shall be in accordance with Paragraph 2.3.



Figure 3.17A

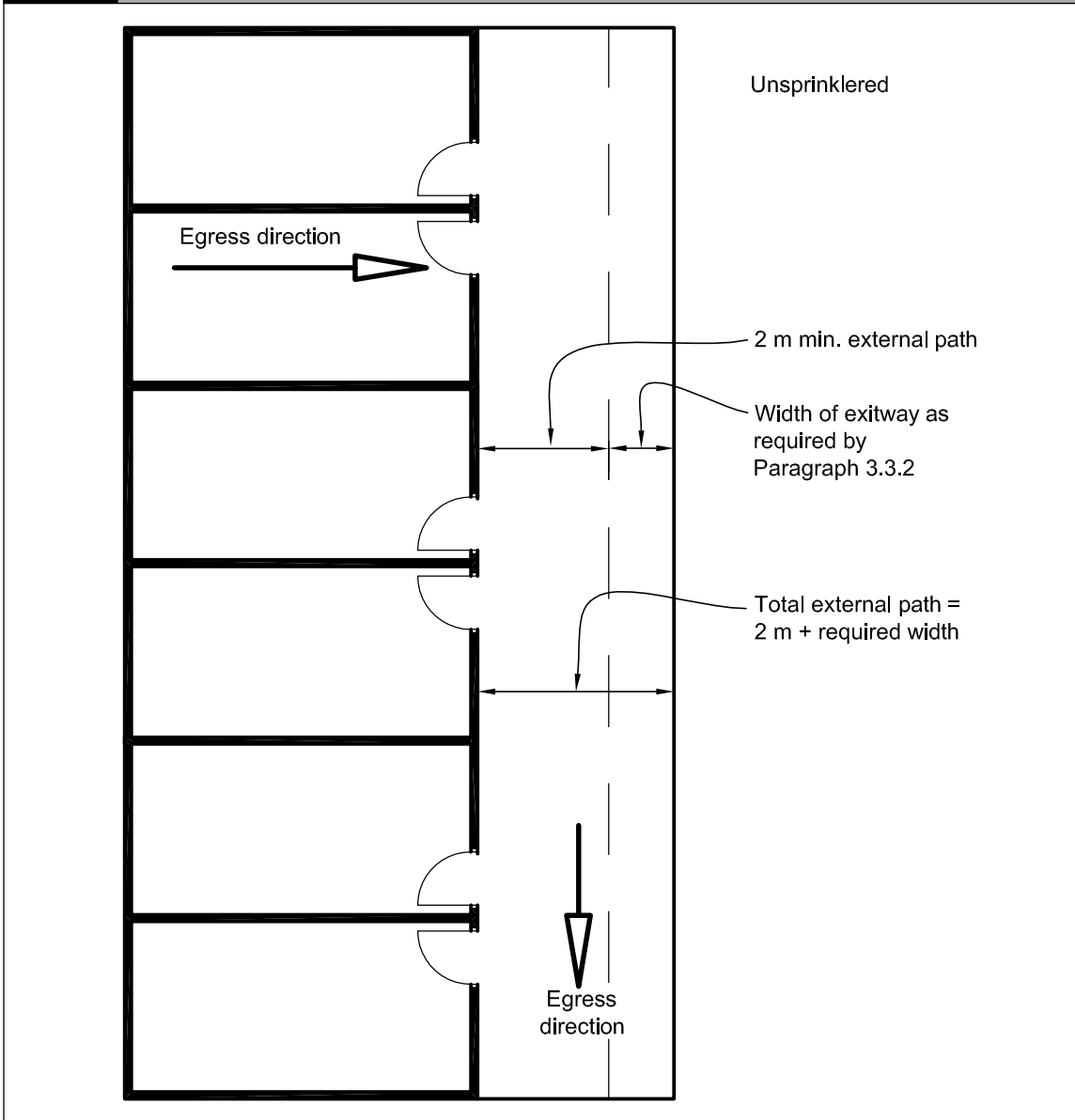
Lifts and smoke separations when landing on an unsprinklered horizontal safe path
Paragraph 3.10.5



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Figure 3.18 External escape routes
Paragraph 3.11.2



3.11.5 For an *escape route* which passes through an opening in an *external wall*, parts of the *external wall* need not be *fire rated* if:

- a) The direction of escape to a single *final exit* diverges from the *external wall* at an angle of no less than 45° in plan, or
- b) The directions of escape to alternative *final exits* diverge from each other at an angle of no less than 90° in plan and the *escape routes* subsequently do not both pass the same *firecell* (other than the *firecell* from which they originated).

Comment:

The relaxation of *fire resistance rating* requirements does not apply where *fire rated construction* is necessary due to the proximity of a *relevant boundary* (see Paragraph 5.3).

- c) DELIBERATELY LEFT BLANK
- d) For shop fronts, if the exit is onto the footpath it is not required to be *fire rated*.

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- f) They shall be *constructed* to ensure that the forces required to open these doors do not exceed those able to be applied:
 - i) with a single hand to release the latch (where fitted), and
 - ii) using two hands to set the door in motion, and
 - iii) using a single hand to open the door to the minimum required width.

Comment:

These requirements are based on the force requirements of Appendix C C6.1.3.

Locking devices

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

- a) Be clearly visible, located where such a device would be normally expected and, in the event of *fire*, designed to be easily operated without a key or other security device and allow the door to open in the normal manner.

If the operation of a locking device is unusual, such as the pressing of a button close to the door, it shall have signage that complies with NZBC F8.3.1, and

Comment:

Examples of unacceptable locking or security devices are card access and keypad locks that are not interfaced with the fire alarm and detection systems.

- b) Not prevent or override the direct operation of panic bolts fitted to any door, and
- c) If they are of an electromechanical type, they shall, in the event of a power failure or door malfunction, either:
 - i) automatically switch to the unlocked (fail-safe) condition, or
 - ii) be readily opened by an alternative method satisfying the requirements of Paragraph 3.15.2 a), and
- d) If the *escape height* is greater than 25 m occupants in the vertical *safe path* shall be able to re-enter a floor at a maximum interval of 4 floors. Doors required to be unlocked from the *safe path* side may be unlocked at all times or only when the fire alarm is activated. Doors designated as available for entry shall have signage indicating their status.

Comment:

One way of ensuring compliance with Paragraph 3.15.2 is to develop a *building* management plan.

This Acceptable Solution specifies that the greatest distance between unlocked stair doors is 3 floors. This is to ensure that:

- a) In multi stair *buildings* people escaping down a stair are able to move from one stair to another and can continue their escape along an alternative route via a route across a floor if one stair becomes smoke-logged or unusable for any other reason.
- b) In single stair *buildings*, people are able move out of the stair and wait for rescue by emergency services within the floor.

The requirement applies to the whole height of the vertical *safe path*, meaning that once required on a *safe path* greater than 25 m, *escape height* floors between 25 m and ground also have to comply. The doors may be locked during normal occupation but must be available upon activation of the fire alarm.

Direction of opening

3.15.3 Doors on *escape routes* shall be hung to open in the direction of escape. However, this is not required if the number of occupants of spaces with egress using the door is no greater than 50. If escape may be in either direction, doors shall swing both ways. For manual sliding doors, see Paragraph 3.15.1.

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Degree and width of opening

3.15.5 Doors on *escape routes* (see Figure 3.22) shall satisfy the following requirements:

- a) In *open paths*, provide an unobstructed opening width of no less than 760 mm and, when multi-leaf, have no single leaf less than 500 mm wide. The minimum door opening width may be reduced to 600 mm if it is not required to be an *accessible route*, and
- b) Within *exitways* (including entry and *final exit* doors), reduce the minimum *exitway* width (required by Paragraph 3.3) by no more than the 125 mm allowed under Paragraph 3.3.6 d) to:

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- i) 725 mm into horizontal *safe paths*, or
 - ii) 875 mm within horizontal *safe paths* and in vertical *safe paths*, and
- c) Open no less than 90°, and
- d) Open onto a floor area which:
- i) Extends for a distance of no less than the arc of the door swing, and
 - ii) Is at the same level on both sides of the door for the full width of the *escape route*.

Comment:

A 20 mm threshold weather-stop is acceptable on external doors (see Acceptable Solution D1/AS1).

- e) When opened, not cause the door swing to obstruct the minimum required width of any *escape route*. For example, doors which open onto a corridor used as an *escape route* shall not obstruct the minimum required width of that *escape route* (see Figure 3.23).

Vision panels

3.15.6 Vision panels shall be provided on doors which:

- a) Are hung to swing both ways, or
- b) Lead into, or are within, *exitways* that swing in the direction of escape, or
- c) Subdivide corridors used as *escape routes*.

Revolving doors, automatic doors and access control systems

3.15.7 Revolving doors (see Figure 3.24 a)), automatic doors (of all types) and access control systems shall:

- a) Not be allowed across an *escape route* at any point leading into or within an *exitway*, but
- b) Be allowed in an *open path* or at a *final exit* provided that, in the event of a power failure or malfunction, the doors or access control systems continue to provide a safe *means of escape from fire* without reducing the required width by:
 - i) automatically opening and remaining open, or

- ii) being readily pushed to the outward open position by the *building* occupants in an emergency (refer to Figure 3.24 b)).

Comment:

Access control systems may be in the form of turnstiles or entrance gates, in both horizontal and vertical planes. These are usually found in shopping centres, entertainment venues and similar occupancies.

The requirements in ii) are based on the force requirements in Appendix C C6.1.3.

3.15.8 Paragraph 3.15.7 b) need not apply if alternative swing doors of the required width are provided immediately adjacent to the revolving or sliding doors. See Paragraph 3.16 for signage requirements.

Hold-open devices

3.15.9 Detector activated *hold-open devices* shall be fitted to *fire doors* or *smoke control doors* required:

- a) Between *open paths* and *exitways* if the *occupant load* is greater than 1,000, and
- b) For subdividing long corridors (see Paragraph 4.12), and
- c) In *fire separations* where an *escape route* passes into an adjacent *firecell* (see Paragraph 3.7.13), and

Comment:

An example of c) would be between a horizontal *safe path* or *smoke lobby* and a vertical *safe path*.

- d) In locations where, due to the type or volume of occupant traffic using the doors, the doors may be kept open by unauthorised means.

Comment:

Hold-open devices are used where it is not practical to assume *fire doors* and *smoke control doors* will remain closed, because of the type or volume of occupant traffic using the doors. The devices should eliminate the unsafe practice of wedging or otherwise keeping self-closing doors open.

For the convenience of *building* occupants, it is often useful to provide a clearly-labelled push-button release adjacent to doors with *hold-open devices*.

4.9 Exitways

4.9.1 *Exitways*, unless external and separated by distance, shall comprise *smoke lobbies* which are *smokecells* and *safe paths* which are *firecells*.

4.9.2 The *safe path* shall be separated from all adjoining *firecells* by *fire separations* with an *FRR* in accordance with Paragraph 2.3 throughout its length. If the *escape height* is greater than 10 m, the *fire separation* shall have an *FRR* meeting the *property rating*.

4.9.3 *Safe paths* which are stairs leading from lower floors or *basements*, and which continue to floors above the level of the *final exit*, shall have the lower levels *fire separated* from the *final exit* level. The *fire separation* shall have an *FRR* in accordance with Paragraph 2.3 or that required for the lower level, whichever is the greater.

4.9.4 *Safe paths* which are long corridors shall be subdivided by *smoke separations* in accordance with Paragraph 4.12.

4.9.5 Air ducts passing through *exitways* shall not include *combustible* materials.

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4.9.7 THIS PARAGRAPH DELIBERATELY LEFT BLANK

4.10 Intermittent activities

Support activities

4.10.1 Intermittent activities providing direct support to a primary activity of another *risk group* may be included with the other *risk group* and do not require *fire* or *smoke separation*, unless they are provided for enclosed waste storage or car parking. The *fire safety systems* required for each *risk group* shall also apply throughout these spaces. If these spaces are required to be separate *firecells*, they shall have *fire separations* with *FRRs* in accordance with Paragraph 2.3.

Comment:

Examples of spaces which provide support functions and are occupied intermittently include corridors, tearooms, ironing rooms, laundries, waiting rooms and kitchens in assembly halls.

Solid waste storage

4.10.2 Solid waste storage areas shall be enclosed when located adjacent to *occupied spaces*; in other situations these areas may be unenclosed. Enclosed solid waste storage areas within any *firecell* shall themselves be a separate *firecell* separated from adjacent *firecells* by *fire separations* having an *FRR* of no less than 60 minutes (see Paragraph 4.11.5 for waste chutes).

Plant, boiler and incinerator rooms

4.10.3 Any space within a *building* (see Figure 4.5) containing an incinerator, plant, boiler or machinery which uses solid fuel, gas or petroleum products as the energy source (but excluding space and local water heating appliances) shall be a separate *firecell* with an *FRR* of no less than 90 minutes, and shall have:

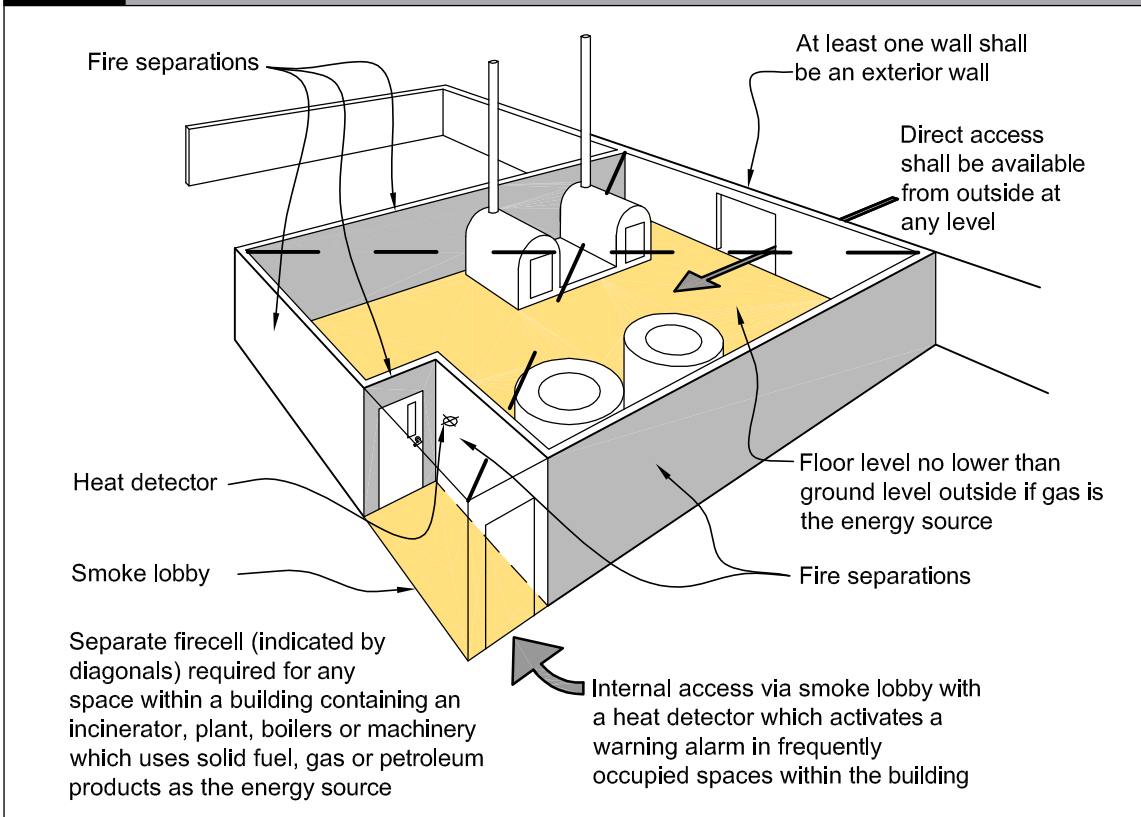
- a) At least one *external wall*
- b) External access that may be at any floor level including the roof. Where alternative internal access is provided it shall be via a *smoke lobby* that is protected with a heat detector connected to a Type 2, 3 or 4 alarm system, and
- c) Its floor level no lower than the ground level outside the *external wall* if gas is the energy source.

4.10.4 If plant is contained in a *building* which is solely for the purposes of containing such plant, and that *building* is separated by 3.0 m or more from any adjacent *building*, only Paragraph 4.10.3 c) shall apply.

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Figure 4.5 Plant, boiler and incinerator rooms
Paragraph 4.10.3



4.11 Protected shafts

Lifts, conveyors and services

4.11.1 Lifts, conveyors and services which pass from one *firecell* to another shall be enclosed within *protected shafts*.

Comment:

Paragraph 3.10.3 describes the requirements for the installation of a passenger lift in a vertical *safe path* containing a *stairway*. Paragraph 3.10.3 requires the vertical *safe path* to be a single *firecell*.

Fire separation

4.11.2 Every *protected shaft* shall be a separate *firecell* within the *firecell* or *firecells* in which it is located (see Figure 4.6). The shaft walls between each floor shall have an *FRR* of no less than that required by the *life rating* of the *risk group* for that level.

The *FRR* of the shaft wall applies to both sides equally, except in the case of lift landing doors (see Paragraph 4.16.11).

4.11.3 *Protected shafts* which do not extend through the roof or lowest floor shall be enclosed at top and bottom by *construction* which satisfies the relevant requirements of Paragraph 4.4 for *fire stopping* (see Figure 4.6).

Exceptions to cavity barrier requirements

4.15.4 *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 through which litter can accumulate, 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 encapsulated with a material having a *Group Number* of no greater than 2.

Comment:

See Verification Method C/VM2 Appendix A for the method for assigning *Group Numbers* to materials.

Cavity barrier construction

4.15.5 *Cavity barriers* shall:

- a) Not reduce the *FRR* required for the element within which they are installed
- 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*.

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4.15.7 THIS PARAGRAPH DELIBERATELY LEFT BLANK

4.15.8 THIS PARAGRAPH DELIBERATELY LEFT BLANK

4.16 Closures in fire and smoke separations

Introduction

4.16.1 If activities within a *building* require openings in *fire* or *smoke separations* (eg, for the passage of people or goods), closures to those openings shall have the *fire* resistance and smoke control performance as follows:

- a) DELIBERATELY LEFT BLANK
- b) An *FRR* of -/60/- sm as the buildings are sprinklered.

Comment:

sm indicates that the closure performs as part of a *smoke separation*. See Paragraph 4.16.2 b) for doors in *smoke separations* and Paragraph 4.16.10 for access panels.

4.16.2 *Doorsets* which are required to be:

- a) *Fire doors* shall comply with Appendix C C6.1.1
- b) *Smoke control doors* shall, except as allowed by Paragraph 4.16.3, comply with Appendix C C6.1.2, and
- c) *Fire doors* with smoke control capability shall comply with both a) and b).

Comment:

Smoke seals may be of the brush type and need not incorporate intumescent material. However, intumescent seals may be required if the door is also a *fire door*.

4.16.3 *Doorsets* installed in *fire separations* between *firecells* and vertical *safe paths* or *protected shafts* shall have smoke seals on all edges, except that smoke seals may be omitted:

- a) At the sill of *doorsets*, and
- b) For lifts.

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Fire door and smoke control door installation

4.16.4 *Fire doors and smoke control doors* shall be installed in accordance with Paragraph 3.15.

Doorset markings

4.16.5 *Doorsets* shall be clearly marked to show their *FRR* and, if required, to show their smoke-stopping capability. Other signage requirements shall be as specified in Paragraph 3.16.

4.16.6 Markings and labelling shall, in all other respects, comply with NZS 4520.

Glazing in doors

4.16.7 Glazing in *fire doors and smoke control doors* shall comply with Paragraph 4.2.

Smoke control doors

4.16.8 *Smoke control doors* complying with Paragraphs 4.16.2 to 4.16.7 shall be provided:

- a) DELIBERATELY LEFT BLANK
- b) Where a corridor or an *escape route* passes through a *smoke separation* (see Figure 4.12 and for long corridors Figure 4.7), and
- c) Between an *open path* and a *smoke lobby* (see Figures 4.13 and 4.14).

Figure 4.12 Smoke control doors
Paragraph 4.16.8

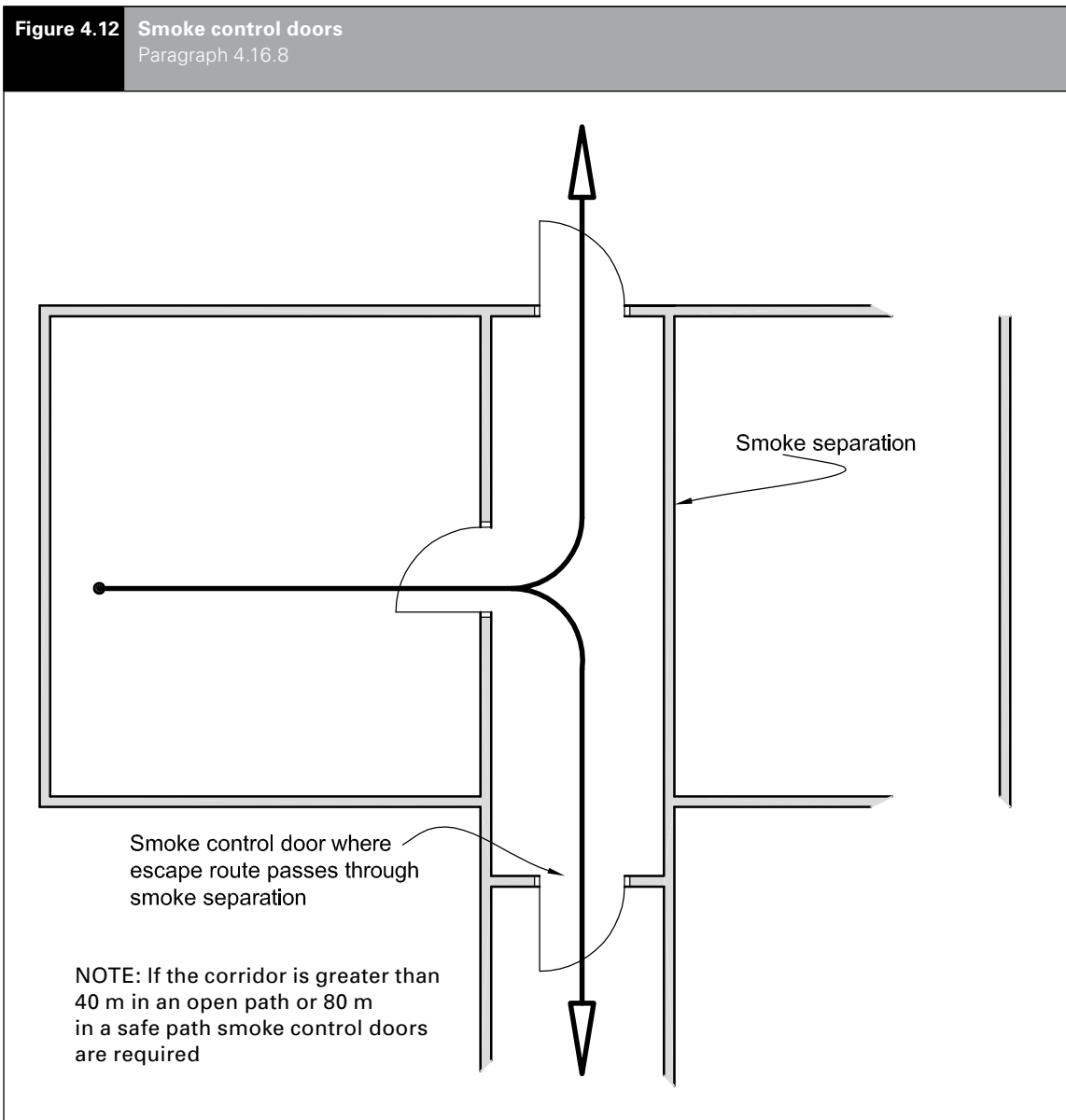
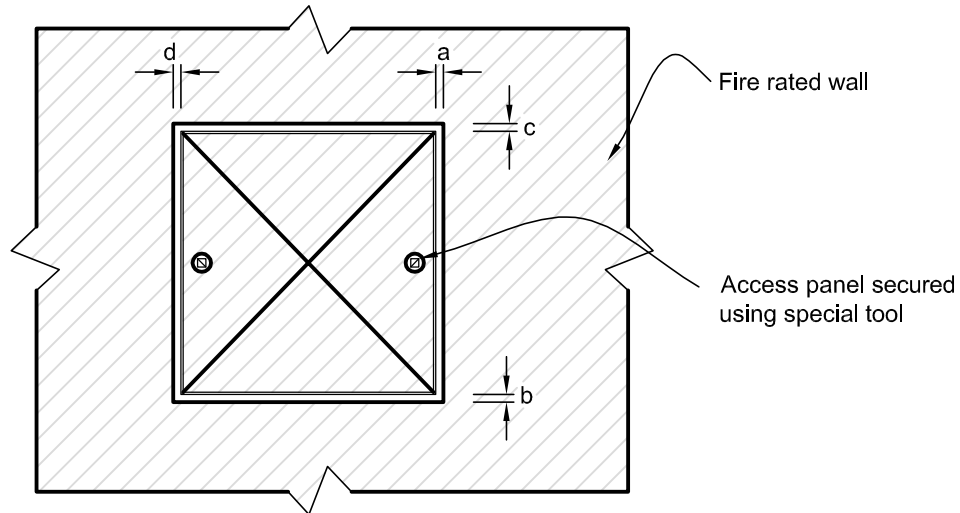


Figure 4.17

Access panels
Paragraph 4.16.10



NOTE: Dimensions $a + b + c + d = 8 \text{ mm}$ maximum

Lift landing doors

4.16.11 Other than where Paragraph 3.10.3 for a passenger lift within a vertical *safe path* applies, *doorsets* for lift landing doors opening into lift shafts which are *protected shafts* shall be *fire doors* complying with Paragraphs 4.16.1 to 4.16.3 except that an *insulation* rating is not required. Lift landing doors need not be *fire* rated from the shaft side.

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Fire dampers

4.16.12 Any duct (unless fully enclosed by *construction* with an *FRR* no less than required for the *fire separation*) that passes through a *fire separation* shall not reduce the *fire* resistance of the *construction* (excluding *external walls* and roofs) through which the duct passes.

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Where a *fire damper* is used to maintain the required *fire* resistance it shall:

- a) comply with AS/NZS 1668.1, and
- b) have a *fire integrity* and *insulation* rating no less than that of the *fire separation*, except that the damper blade is not required to have an *insulation* rating if the *building* is sprinkler protected or means are provided to prevent *combustible* materials being placed closer than 300 mm to the *fire damper* and air duct.

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Fire dampers shall be capable of being readily accessed for servicing.

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Fire shutters

4.16.13 If a floor has a service opening (eg, for stairs, a conveyor, forklift access, or similar installation), which is not used as part of an *escape route*, and which is fitted with a *fire shutter*, the floor may be treated as a *fire separation*.

4.16.14 The *fire shutter* shall be automatically activated by a signal from a smoke detector.

4.16.15 A *fire shutter* shall include a device to retard the rate of closing to no more than 150 mm per second.

4.17 Interior surface finishes, floor coverings and suspended flexible fabrics

Surface finish requirements for walls, ceilings, ducts and insulation

4.17.1 *Surface finish* requirements shall be as specified in Table 4.1.

Table 4.1 Surface finish requirements				
Crowd spaces	Exitways All occupied spaces in importance level 4 buildings	All other occupied spaces	Ducts for HVAC systems – internal surfaces	Ducts for HVAC systems – external surfaces
Maximum permitted Group Number				
2	2	3	2	3

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Comment:

The method for assigning the *Group Number* to a material is specified in Verification Method C/VM2 Appendix A. Particular note should be made of the requirements for ducts. There are also instances of certain *surface finishes* being assigned *Group Numbers* without evaluation e.g. films and paint coatings.

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Foamed plastics and combustible insulating materials

4.17.2 If *foamed plastics building materials* or *combustible insulating materials* form part of a wall or ceiling system, the completed system shall achieve a *Group Number* as specified in Table 4.1 and the *foamed plastics* shall comply with the flame propagation criteria as specified in AS 1366 for the material being used. This requirement does not apply to *building elements* listed in Paragraph 4.17.6.

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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 (see Appendix A of C/VM2), 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.

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Flooring

4.17.3 Flooring shall be either *non-combustible* or, when tested to ISO 9239-1, shall have a critical radiant flux of not less than that specified in Table 4.2.

4.17.4 Paragraph 4.17.3 shall apply to flexible finishes such as carpets, vinyl sheet or tiles, and to finished or unfinished floor surfaces.

Table 4.2 Critical radiant flux requirements for flooring	
Exitways	All other occupied spaces
Minimum critical radiant flux when tested to ISO 9239-1	
2.2 kW/m ²	1.2 kW/m ²

Wood and wood products in floors

4.17.5 In addition to the requirements of Paragraph 4.17.3, where floors in multi-storey buildings are *fire separations* and where the flooring material is made of wood products (wood products include boards manufactured from wood fibres or chips bound by an adhesive) the flooring material shall have either a thickness of no less than nominally 20 mm, or the floor assembly shall have an *FRR* of -/30/30 when exposed to *fire* from the flooring side.

Comment:

- Nominal 20 mm thickness includes standard flooring products such as 19 mm particle board or 17 mm plywood. These are acceptable.
- Paragraph 4.17.5 addresses potential *fire* spread from the upper to lower *firecell* by limiting *fire* spread down through the floor assembly. Protecting the upper *firecell* from a *fire* in the lower *firecell* is still also a requirement, achieved by use of *fire separations* as described in Paragraph 4.13. Nominal 20 mm thickness includes standard flooring products such as 19 mm particle board or 17 mm plywood. These are acceptable.

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Exceptions to surface finish requirements

4.17.6 *Surface finish* requirements do not apply to:

- Small areas of non-conforming product within a *firecell* with a total aggregate surface area of not more than 5.0 m²
- Electrical switches, outlets, cover plates and similar small discontinuous areas
- Pipes and cables used to distribute power or services



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- d) *Handrails* and general decorative trim of any material such as architraves, skirtings and window components, including reveals, provided these do not exceed 5% of the surface area of the wall or ceiling they are part of
- e) *Damp-proof courses*, seals, caulking, flashings, thermal breaks and ground moisture barriers
- f) Timber joinery and structural timber *building elements constructed* from solid wood, glulam or laminated veneer lumber. This includes heavy timber columns, beams, portals and shear walls not more than 3.0 m wide, but does not include exposed timber panels or permanent formwork on the underside of floor/ceiling systems
- g) Individual *doorsets*, and
- 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 less.
- i) DELIBERATELY LEFT BLANK
- j) DELIBERATELY LEFT BLANK

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Suspended flexible fabrics

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

- a) Have a *flammability index* of not 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.

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4.17.10 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Air ducts

4.17.11 Where air ducts are contained wholly within a *protected shaft*, provided the shaft does not also contain lifts, only the interior *surface finish* of the air duct is required to comply with Table 4.1.

4.18 Building services plant

Automatic activation

4.18.1 When any smoke detection system is activated, it shall automatically turn off all air-conditioning and mechanical ventilation which is not required or designed for *fire* safety.

Comment:

Paragraph 4.18.1 does not apply to non-distributed ventilation and air-conditioning such as typical domestic/commercial heat pump units.

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Air handling systems

4.18.2 Where smoke control in air handling systems is required to prevent the recirculation of smoke through an air handling system to other *firecells* in a *building*, these systems shall be as specified in Appendix A A2.1.



Part 5: Control of external fire spread

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- 5.1 Fire separation for buildings with more than one title
- 5.2 Horizontal fire spread from external walls
- 5.3 FRRs of external walls
- 5.4 Small openings and fire resisting glazing
- 5.5 Table method for external walls
- 5.6 Horizontal fire spread from roofs and open sided buildings
- 5.7 Vertical fire spread
- 5.8 Exterior surface finishes

5.1 Fire separation for buildings with more than one title

5.1.1 When a *building* is subdivided so that the *building* straddles more than one title, each part of the *building* located on a separate title, other than titles comprising vehicle parking areas, shall be separated from:

- a) The part of the *building* on an adjacent title, by *fire separations* having an *FRR* meeting the *property rating* in accordance with Paragraph 2.3 (see Acceptable Solution C/AS7 for allowances in vehicle parking areas of *buildings* separated into multiple titles), and
- b) Any external area in common (unless Paragraph 5.1.2 applies) by *external walls* complying with Paragraph 5.3, except that, if roofed, the area in common shall be a *firecell*, separated from adjacent titles by *fire separations* meeting the *property rating* in accordance with Paragraph 2.3.

Comment:

In a) above, vertical *fire separations* provide *fire* ratings between titles. Floors between titles are also *fire separations* and provide the horizontal separation. See Acceptable Solution C/AS7 for allowances in vehicle parking areas of *buildings* separated into multiple titles.

In b) above, a *notional boundary* is established between the titles, and the permitted *unprotected area* in the *external walls* of both titles is determined with respect to that *notional boundary*. When the area in common is roofed, the danger to life and adjacent property is increased; hence the need for greater precautions.

5.1.2 When a *building* is subdivided (as in Paragraph 5.1.1 a)), and all the titles and any areas in common are sprinklered throughout, the requirements for *fire separations* of Paragraph 5.1.1 b) need not apply. However, the requirements for separation of *safe paths* in Paragraphs 4.9.2 and 4.9.3 shall still apply.

5.2 Horizontal fire spread from external walls

Separation

5.2.1 Specific separation requirements for *unprotected areas* in *external walls* shall be applied in the following circumstances:

- a) If, due to the configuration of a single *building* or the siting of other *buildings* on the same property, *external walls* of adjacent *firecells* are exposed to each other at an angle of less than 90°, and one or both *firecells* contain sleeping *risk groups* or *exitways*, or
- b) If there are *unprotected areas* in *external walls* facing a *relevant boundary* to *other property* at an angle of less than 90°.

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Errata 1
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Comment:

When the vertical planes of two *external walls* of separate *firecells*, or of an *external wall* and a *relevant boundary* of *other property* (where the wall faces that *boundary*), intersect at an angle of less than 90°, there is potential danger of *fire* spread between *firecells* or to *other property*.

Errata 1
Feb 2013

5.2.2 Protection shall be achieved by using one or more of the following approaches:

- a) DELIBERATELY LEFT BLANK
- b) Distance separation (see Paragraph 5.5)
- c) Limiting *unprotected areas* in *external walls* (see Paragraph 5.5)
- d) Using *fire resisting glazing* (see Paragraph 5.4).

5.2.3 Where the intersection angle of the *building* and the *relevant boundary* is 90° or greater, there are no requirements and an *unprotected area* of 100% is permitted for the *external wall*.

5.2.4 If a wall or part of a wall is less than 1.0 m from the *relevant boundary*, a combination of small *unprotected areas* and *fire resisting glazing* is permitted as detailed in Paragraph 5.4.

5.2.5 Table 5.2 applies only to the permitted *unprotected area* in *external walls* 1.0 m or more from the *relevant boundary*. This can be combined with the areas of *fire resisting glazing* and small *unprotected areas* in Paragraph 5.4.

5.2.6 Regardless of the method adopted, all parts of an *external wall* other than allowable *unprotected areas* shall have the appropriate *FRR* as specified by the relevant parts of this Acceptable Solution.

Analysis required for all external walls

5.2.7 The analysis shall be done for all *external walls* of the *building* to check the permitted *unprotected area* in each wall.

Notional boundary – firecells on the same property

5.2.8 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 Tables 5.1, 5.2 and 5.3, the words *relevant boundary* shall be interpreted as *notional boundary*.

5.2.9 Where one or both *firecells* on the same property contain *risk groups* SI, SM, SH or *exitways*, analysis shall be done separately for each *firecell* with respect to the same *notional boundary*.

5.3 FRRs of external walls

5.3.1 *Building elements* that are part of an *external wall* that is required to be *fire rated* shall be *fire rated* as required by Paragraph 2.3. If a *safe path* has an *external wall*, that wall may be 100% unprotected provided any walls between the *safe path* and adjacent *firecells* have an *FRR* determined using the *property rating*.

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5.3.2 Any part of an *external wall* enclosing a *firecell* and not permitted to be an *unprotected area* shall have an *FRR* based on the *property rating* in accordance with Paragraph 2.3. If the *external wall* is less than 1.0 m from the *relevant boundary* the wall shall be *fire rated* to protect from both directions.

Errata 1
Feb 2013

5.3.3 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 no less than the *life rating* in accordance with Paragraph 2.3.

Comment:

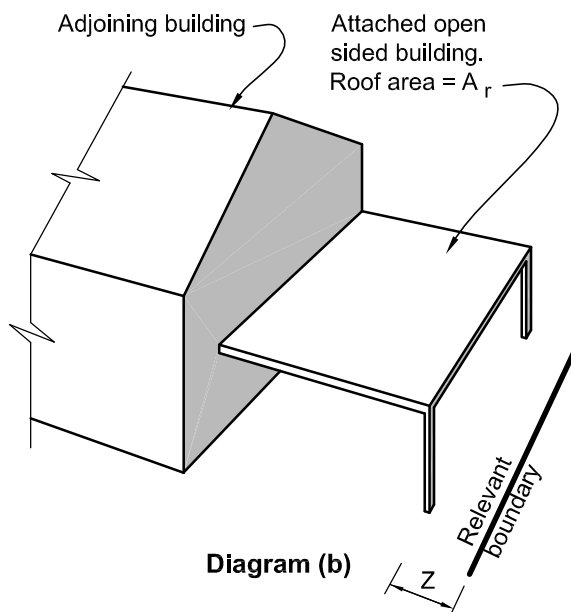
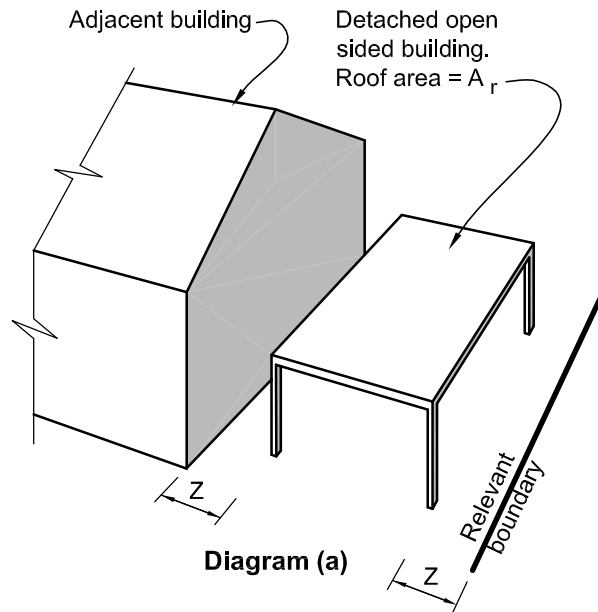
Primary elements are required to be *fire rated* in *buildings* with an *escape height* of greater than 25 m, and where they support, or are an integral part of, other *fire rated building elements*.

5.4 Small openings and fire resisting glazing

5.4.1 *External wall construction* shall meet the following requirements:

- a) *Unprotected areas* (referred to as Type A areas) and areas of *fire resisting glazing* (referred to as Type B areas) shall be located to comply with Figure 5.1, and
- b) The remainder of the wall shall be *fire rated* equally for exposure to *fire* on both sides.

Figure 5.5 Open sided buildings – distance and FRR requirements
Paragraph 5.6.6



Separation distances for non-fire rated construction

When A_r is no greater than 40 m², 'Z' shall be no less than 0.3 m.
When A_r exceeds 40 m², 'Z' shall be no less than 1.0 m.

NOTES:

1. This figure applies only to single storey open sided buildings.
2. In all cases at least two sides of the perimeter wall shall be completely open to the environment.

5.6.7 A *building* having only a single floor level may be *constructed* with walls and roof having 100% *unprotected area* provided that:

- a) At least two sides of the perimeter wall are completely open to the environment, and
- b) If attached to another *building*, both *buildings* are under the control of the same occupancy, and
- c) For unlimited roof plan areas, no part of the roof is closer than 1.0 m to a *relevant boundary*, and
- d) For roof plan areas of no greater than 40 m², no part of the roof is closer than 0.3 m to a *relevant boundary*.

Comment:

Examples of open sided *buildings* having a roof area exceeding 40 m² are loading canopies, while those with roof areas of less than 40 m² would be structures such as lean-to's.

Floor projections

5.6.8 If a floor projects beyond the face of any part of an *external wall* which requires a *property rating*, or any part of the projection is closer than 1.0 m to the *relevant boundary*, the floor projection shall have the same *FRR* as the floor inside the *external wall*, and exposed exterior faces of the projection shall comply with Paragraph 5.8.

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Jul 2014

5.7 Vertical fire spread

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Roofs

5.7.1 Sleeping *risk groups*, *other property* and external *exitways* shall be protected against vertical *fire* spread from roofs.

5.7.2 Sprinklers are required in the *firecell* below the roof. This achieves the requirement for protection against vertical *fire* spread.

External exitways over roofs

5.7.3 Subject to Paragraph 3.11.4, when an external *exitway* crosses a roof or is above or adjacent to a roof on the same or another *building*, the roof within 3.0 m of any part of the *exitway* and all supporting elements shall have an *FRR* in accordance with Paragraph 2.3.

Primary elements

5.7.4 *Primary elements* providing support to an area of *fire* rated roof shall have an *FRR* of no less than that of the roof.

5.7.5 When supporting an unrated roof:

- a) *Primary elements* such as columns or walls which are required to be *fire* rated shall be rated from floor level to the underside of the roof framing members, and
- b) Any roof framing members connected to these *fire* rated columns or walls shall also be rated if their collapse in *fire* would cause the consequential collapse of the rated columns or walls.

Fire spread from an adjacent lower roof

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Comment:

Risk group WS is required to have automatic sprinklers installed. Therefore, there are no further requirements to protect against *fire* spread from an adjacent roof.

External fire spread between different levels of the same building

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5.7.11 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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Table 5.4: This Table not required for this Acceptable Solution

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5.7.14 THIS PARAGRAPH DELIBERATELY LEFT BLANK

5.7.15 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Comment:

Risk group WS is required to have automatic sprinklers installed. Therefore, there are no further requirements to protect against *fire* spread from different levels of the same *building*.

Appendix C (normative): Test methods

C1.1 General

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

Comment:

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

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C2.1 Flammability of floor coverings

Materials shall be assigned a critical radiant flux when tested to:

ISO 9239 Reaction to fire tests for flooring – Part 1: Determination of the burning behaviour using a radiant heat source.

Or in lieu of testing refer to Table B1 of Appendix B of C/VM2.

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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 Material for internal surface linings shall be given a *Group Number* in accordance with Appendix A of C/VM2 and tested to either:

ISO 5660 Reaction-to-fire tests
Part 1 Heat release rate (cone calorimeter method), and
Part 2 Smoke production rate (dynamic method), or

ISO 9705 Fire tests – Full scale room test for surface products.

Or in lieu of testing refer to Table A1 of Appendix A of C/VM2.

Errata 1
Feb 2013

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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:

- AS 1530 Methods for fire tests on building materials and structures – Part 4: Fire resistance tests of elements of building construction, or
- NZS/BS 476 Fire tests on building materials and structures – Parts 21 and 22.

C5.1.2 *Fire stops* shall be tested:

- 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
- In accordance with AS 4072: Components for the protection of openings in fire-resistant separating elements – Part 1: Service penetrations and control joints.

Errata 1
Feb 2013

C6.1 Fire doors and smoke control doors

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

Smoke control doors

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

- a) The door is a *fire door* that is fitted with appropriate smoke seals, or if:
- b) It is *constructed* with solid core leaves. Solid timber core leaves, when used, shall have a leaf thickness of no less than 35 mm, and
- c) It is provided with smoke seals as required by this Acceptable Solution. Smoke seals shall be in continuous contact with the mating element, and located so as to minimise interruption by hardware, and
- d) The frames are constructed of timber, and the jambs are no less than 30 mm thick, and
- e) Any vision panel cut-outs are no less than 150 mm from the leaf edges, and
- f) The maximum average clearances (excluding pre-easing) are:
 - i) Leaf to frame 3 mm
 - ii) Leaf to leaf 5 mm
 - iii) Leaf to top of any floor covering 10 mm, and
- g) Any additional facings shall be adhesive fixed, and
- h) It is provided with signage identifying it as a *smoke control door* in accordance with Acceptable Solution F8/AS1.

Frictional forces

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

Self-closing provision

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

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

Comment:

1. These circumstances can occur where people are under care. Leaving the door to the occupant's room (or *suite*) open reduces that occupant's feeling of isolation and permits ready observation by staff.
2. Self-closers can be an obstruction to the elderly and *people with disabilities*, who may have difficulty in opening the door against the pressure applied by the self-closer. Acceptable Solution C/AS3 Paragraph 4.6 describes situations where smoke control doors do not have to be self closing where they are used within a *group sleeping area* or *suite*.

Automatic smoke-sensing devices

C6.1.6 Automatic smoke-sensing devices complying with NZS 4512, if used, shall be positioned within the stream of air that passes the door when the *smoke control door* is fully open.

C7.1 Fire properties of external wall cladding systems

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

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

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C7.1.2 In addition to meeting the general requirements of ISO 5660 Part 1, testing shall be in accordance with the following specific requirements:

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

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

C7.1.4 *External wall* cladding systems which comprise only materials which individually are classified as *non-combustible* may be deemed to satisfy all the requirements of Paragraph 5.8.1.

Comment:

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

C7.1.5 Claddings incorporating a metal facing with a melting point of less than 750°C covering a *combustible* core or insulant shall be tested as described in Paragraph C7.1.2 without the metal facing present.

Comment:

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

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