C/AS2

Acceptable Solution for Buildings with Sleeping (non institutional) (Risk Group SM)

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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Acceptable Solutions and Verification Methods are available from www.building.govt.nz

New Zealand Government

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Status of C/AS2

This Acceptable Solution C/AS2, for buildings used for sleeping (non institutional) (Risk Group SM), 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/AS2

This Acceptable Solution is effective from 1 January 2017. 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 January 2017.

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

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## References

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

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AS 1530:- Methods for fire tests on building materials, components and structures
Part 1: 1994 Combustibility test for materials
Part 2: 1993 Test for flammability of materials
Part 4: 2005 Fire-resistance tests of elements of building construction

AS 1691: 1985 Domestic oil-fired appliances – installation
AS 4072:- Components for the protection of openings in fire-resistant separating elements
Part 1: 2005 Service penetrations and control joints

AS ISO 9705: 2003 Fire tests – Full scale room test for surface products

International Standards Organisation

ISO 5660:- Reaction-to-fire tests – Heat release, smoke production and mass loss rate
Part 1: 2002 Heat release rate (cone calorimeter method)
Part 2: 2002 Smoke production rate (dynamic measurement)

ISO 9239:- Reaction to fire tests for flooring

ISO 9705: 1993 Fire tests – Full scale room test for surface products

European Standards

BS EN 12101 Smoke and heat control systems
Part 1: 2005 Specification for smoke barriers
EN 13501 Fire classification of construction products and building elements.
Part 1: 2007 Classification using test data from reaction to fire tests

Building Research Establishment (UK)

BRE Defect Action Sheet DAS 131: May 1989
External walls: Combustible external plastics insulation: Horizontal fire barriers

BRE Report 135: 1988

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
American Society for Testing and Materials
ASTM D 2898: 2010 Standard practice for accelerated weathering of fire-retardant-treated wood for fire testing

New Zealand Legislation
Fire Safety and Evacuation of Buildings Regulations 2006
Hazardous Substances and New Organisms Act 1996

Australian Building Codes Board
National Construction Code
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.

**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.

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

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

**Building 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 jamb** 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.
Final exit The point at which an escape route terminates by giving direct access to a safe place.

Comment: Final exits are commonly the external doors from a ground floor, but this applies only if such doors open directly onto a safe place. If a safe place can be reached only by passing down an alley, or across a bridge, then the final exit is not reached until the end of such an alley or bridge. Final exits, therefore, should be seen strictly as a point of arrival, rather than as any particular element of a building. They are determined entirely by the definition of safe place.

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

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

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

Fire damper A device with a specified FRR complete with fixings and operating mechanism for automatically closing off an airway where it passes through a fire separation.

Comment: An airway may be a duct, plenum, ceiling space, roof space or similar construction used for the passage of ventilating air.

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

Fire hazard means the danger of potential harm and degree of exposure arising from—

a) the start and spread of fire; and
b) the smoke and gases that are generated by the start and spread of fire.

Fire load The sum of the net calorific values of the combustible contents which can reasonably be expected to burn within a firecell, including furnishings, built-in and removable materials, and building elements. The calorific values shall be determined at the ambient moisture content or humidity. (The unit of measurement is MJ.)

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

Fire resistance rating (FRR) The term used to describe the minimum fire resistance required of primary and secondary elements as determined in the standard test for fire resistance, or in accordance with a specific calculation method verified by experimental data from standard fire resistance tests.

It comprises three numbers giving the time in minutes for which each of the criteria structural adequacy, integrity and insulation are satisfied, and is presented always in that order.

Comment: Examples of FRRs are:

- a) 60/60/30 indicating structural adequacy 60 minutes, integrity 60 minutes, insulation 30 minutes.
- b) 30/-/- indicating structural adequacy 30 minutes, but no time requirement for integrity or insulation.
- c) 60/30/x indicating structural adequacy of 60 minutes, integrity of 30 minutes, and a requirement for insulation.
**Fire resisting closure** A fire rated device or assembly for closing an opening through a fire separation.

**Comment:**
A fire resisting closure is intended to include fire doors, fire windows or access panels. In this context the opening may be used to permit passage of people or goods, or to transmit light, but does not include an opening to permit the passage of building services.

**Fire resisting glazing** Fixed or openable glazing, complete with frame and fixings, mullions, transoms and glazing beads, with a specified FRR and complying with NZS 4232: Part 2.

**Comment:**
1. The requirement for fire resisting glazing will not be met by ordinary window glass, or safety glasses, but rather by wired glass, or by special fire resisting glass shown by test to perform. The nature and design of the frames also have an effect on the performance of fire resisting glazing.
2. Openable glazing is required by NZS 4232 Part 2 to be fitted with an automatic device which, in the event of fire, will close and latch the window sash.

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

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

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

**Fire shutter** A fire rated device, complete with fixings and operating mechanism, for automatically closing off an opening in a fire separation or protected shaft.

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

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

**Fixture** An article intended to remain permanently attached to and form part of a building.

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

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

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

**Flue system** A series of interconnecting flue pipe casings which form a safe passage (flue) for conveying products of combustion from within an appliance to the outside of a building or structure.
Foamed plastics  *Combustible* foamed plastic polymeric materials of low density (typically less than 100 kg/m$^3$) 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, *wharenui*, 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: Upper floors within household units need not meet the specific fire safety requirements which apply to intermediate floors in all other situations.

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.

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

Means of escape from fire In relation to a building that has a floor area,—

a) means continuous unobstructed routes of travel from any part of the floor area of that building to a place of safety; and

b) includes all active and passive protection features required to warn people of fire and to assist in protecting people from the effects of fire in the course of their escape from the fire.

Comment: Means of escape include features providing visibility in escape routes complying with F6 and signs complying with F8.

Multi-unit dwelling Applies to a building or use which contains more than one separate household or family.

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

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

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

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*.

**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.

**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.
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 crossleases, 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.
**Safe place** A place, outside of and in the vicinity of a single building unit, from which people may safely disperse after escaping the effects of a fire. It may be a place such as a street, open space, public space or an adjacent building unit.

| Comment: | The Fire Safety and Evacuation of Buildings Regulations 2006 use the term place of safety and allow the place of safety to be within the building provided that it is protected with a sprinkler system. In this Acceptable Solution a place of safety can only be within a building in Risk Group SI. |

**Secondary element** A building element not providing load bearing capacity to the structure and if affected by fire, instability or collapse of the building structure will not occur.

**Smokecell** A space within a building which is enclosed by an envelope of smoke separations, or external walls, roofs, and floors.

**Smoke control door** A doorset that complies with Appendix C, C6.1.2 of this acceptable solution.

**Smoke lobby** That portion of an escape route within a firecell that precedes a safe path or an escape route through adjoining building which is protected from the effects of smoke by smoke separations.

**Smoke separation** Any building element able to prevent the passage of smoke between two spaces. Smoke separations shall:

a) Be a smoke barrier complying with BS EN 12101 Part 1, or

b) Consist of rigid building elements capable of resisting without collapse:

i) a pressure of 0.1 kPa applied from either side, and

ii) self weight plus the intended vertically applied live loads, and

c) Form an imperforate barrier to the spread of smoke, and

| Comment: | The pressure requirement is to ensure rigidity and is not a smoke leakage requirement. Walls and floors, whether constructed of sheet linings fixed to studs or joists, or of concrete, glazing, metal or fired clay, need only be inspected by someone experienced in building construction to judge whether the construction is tight enough to inhibit the passage of smoke. Item d) is intended to ensure that the smoke separation will continue to perform as an effective barrier when exposed to fire or smoke for a short period during fire development. There is no requirement for smoke control doors or other closures in smoke separations to meet the provisions of item d. |

**Stability** In the context of fire protection is the support provided to a building element having a FRR, intended to avoid premature failure due to structural collapse as a result of applied load, dead and live loads or as a result of any additional loads caused by fire.

**Stairway** A series of steps or stairs with or without landings, including all necessary handrails and giving access between two different levels.

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

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

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

| Comment: | The fire design load should be as specified in B1/VM1. |
Suite A firecell providing residential accommodation for the exclusive use of one person or of several people known to one another. It comprises one or more rooms for sleeping and may include spaces used for associated domestic activities such as hygiene and cooking.

Comment:
1. Bed numbers are limited to six in risk group SI or 12 in risk group SM in accordance with C/AS2 and C/AS3. Examples may be found in hotels, motels and residential care facilities, such as old people’s homes or in hospices providing temporary family accommodation.
2. It is assumed that the social cohesion of the occupants by virtue of the personal relationship (as family members, friends or associates) would ensure that any individual, becoming aware of fire, would naturally assist others within the firecell to escape. The term suite does not apply to a group of bedrooms where each room is available to different “key-holders”. In some cases a suite may be a single bedroom.

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

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

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

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

Wharenui A communal meeting house having a large open floor area used for both assembly and sleeping in the traditional Maori manner.

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

Travel distance The length of the escape route as a whole or the individual lengths of its parts, namely:

a) open paths and

b) safe paths.
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

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

**Comment:**

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** SM. This covers **buildings** or parts of **buildings** where people sleep. This will include the following provided they are no more than 20 storeys high (from ground level):

- a) Apartment **buildings** and other **buildings** which consist of more than one **household unit**
- b) Accommodation units within other **risk groups**
- c) Hotel, motel and serviced apartment **buildings**
- d) Backpackers, cabins on holiday parks
- e) **Buildings** where more than 5 people pay for accommodation (such as homestay/ bed and breakfast)
- f) University halls of residence, education accommodation (eg, school boarding hostels), and
- g) **Wharenui** and other community sleeping spaces.
- h) Sheltered housing such as refuges, reintegration for prisoners, homeless shelters etc.
Outside the scope of this Acceptable Solution

1.1.2 Buildings or parts of buildings in risk groups other than SM 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 or an alternative solution shall be used instead. Complex features include:

a) Atriums
b) Intermediate floors, other than limited area intermediate floors, and
c) DELIBERATELY LEFT BLANK
d) Buildings more than 20 storeys high.

If the Acceptable Solution cannot be followed in full, use Verification Method C/VM2 or an alternative solution 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.

1.1.4 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Hazardous substances not covered by this Acceptable Solution

1.1.5 This Acceptable Solution does not provide for any use, storage or processing of hazardous substances. Compliance with NZBC F3 and the Hazardous Substances and New Organisms Act 1996 shall be ensured where applicable in addition to the requirements of this Acceptable Solution.

1.2 Using this Acceptable Solution

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

Step 1: Determine which Acceptable Solutions apply

a) Determine the risk group for each of the activities carried out in the building (refer to Table 1.1 and to Paragraph 1.1.1 of this and the other Acceptable Solutions). If the activity is not listed explicitly, choose the nearest suitable risk group.

b) 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 SM 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.
Step 2: Determine the parameters for risk group SM

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:

- Age of the building
- Importance level of the building
- 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.
1.4 Calculating occupant loads

**Occupant load**

1.4.1 The occupant load shall be determined from the risk group and number of people in each space of the building. The occupant load may need to be evaluated not only for each risk group but also for:

a) A space or open floor area involving one or more activities, and

b) A floor containing more than one risk group, and

c) A single firecell, and

d) Each floor within a firecell.

1.4.2 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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.

1.4.4 THIS PARAGRAPH DELIBERATELY LEFT BLANK

**Risk group SM**

1.4.5 The occupant load shall be taken as the number of bed spaces.

**Comment:**

1. In this Acceptable Solution, the term ‘beds’ is used to denote the number of people expected to be sleeping in the firecell. Therefore, a double bed counts as two beds, and a tier of three single bunks (one above another) counts as three beds.

2. The number of beds depends on the individual layout in every case. Clearly dormitories will have a far greater number of beds within any given area than single bedrooms in a hospital or an old people’s home, which may have individual lounge areas, toilets and kitchenettes attached. During use, the number of bed spaces must not be increased beyond that initially provided for unless a new building consent is obtained.

**Justification for exceptions**

1.4.6 THIS PARAGRAPH DELIBERATELY LEFT BLANK

1.4.7 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Table 1.2: This table is not required for risk group SM.
Part 2: Firecells, fire safety systems and fire resistance ratings

2.1 Provision of firecells

Firecell floor area limits

2.1.1 The floor area of an unsprinklered firecell shall not exceed 500 m².

2.1.2 If a firecell is sprinklered, the firecell floor area may be unlimited, except if specified otherwise in this Acceptable Solution when building areas require subdivision or other area limitations are imposed.

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 (see Table 2.0). 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.

For permanent accommodation ≤10 m escape height:

a) Type 2 alarm system. A direct connection to the Fire Service is not required if a phone is available at all times for 111 calls. This system is not required where the escape routes serve no more than 10 beds or the exit doors open directly to a safe place or an external safe path, and

b) Type 1 smoke alarms in each apartment.

For permanent accommodation >10 m but ≤25 m escape height, and temporary accommodation ≤25 m escape height:

a) Type 5 alarm system. This system is not required where the escape height is zero and either:

i) escape routes serve no more than 10 beds, or

ii) the exit doors from individual units open directly to a safe place or an external safe path.

Where a Type 5 system is not required, each unit shall be provided with Type 1 smoke alarms located as specified in NZS 4514.
### Table 2.0 Alarm types for various accommodation types and escape heights

<table>
<thead>
<tr>
<th>Category</th>
<th>Escape height (m)</th>
<th>≤ 10</th>
<th>≤ 25</th>
<th>&gt; 10 ≤ 25</th>
<th>&gt; 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent accommodation</td>
<td></td>
<td>Type 1</td>
<td>N/A</td>
<td>Type 5</td>
<td>Type 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 2</td>
<td>N/A</td>
<td>Type 7</td>
<td>Type 18</td>
</tr>
<tr>
<td>Temporary accommodation</td>
<td></td>
<td>Type 5</td>
<td>N/A</td>
<td>Type 9</td>
<td>Type 18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type 18</td>
<td>N/A</td>
<td>Type 18</td>
<td></td>
</tr>
<tr>
<td>Education accommodation</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>Type 5</td>
<td>Type 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td>Type 9</td>
<td>Type 18</td>
</tr>
</tbody>
</table>

**Notes**

1. See Paragraph 2.2.1 for exceptions where not required.
2. See Paragraph 2.2.1 for circumstances that Type 3 or Type 6 may be substituted.
3. See Paragraph 2.2.1 for conditions where Type 6 may be installed.
4. Direct connection to the Fire Service is not required where a phone is available at all times.
5. See Paragraph 2.2.1 for circumstances where this system is not required.
6. Where not required each unit to be provided with Type 1.
7. See Paragraph 2.2.1 for circumstances where direct connection to Fire Service is not required.
8. See Paragraph 2.2.1 for circumstances where direct connection to Fire Service is not required and a Type 3 may be substituted.
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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.

For all accommodation >25 m escape height and education accommodation:

a) Type 7 with Type 5 alarm system, and

b) Type 9 smoke control in any air handling system, and

c) 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.

Comment:
Examples of temporary accommodation are hotels, motels, hostels and backpackers.
Examples of permanent accommodation are apartments.

<table>
<thead>
<tr>
<th>Type of system</th>
<th>System description</th>
<th>Relevant Standards for installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Domestic smoke alarm</td>
<td>Acceptable Solution F7/AS1</td>
</tr>
<tr>
<td>2</td>
<td>Alarm system with manual call points</td>
<td>NZS 4512</td>
</tr>
<tr>
<td>3</td>
<td>Heat detection system with manual call points</td>
<td>NZS 4512</td>
</tr>
<tr>
<td>4</td>
<td>Smoke detection and alarm system with manual call points</td>
<td>NZS 4512</td>
</tr>
<tr>
<td>5</td>
<td>Enhanced smoke detection and alarm system with manual call points</td>
<td>NZS 4512</td>
</tr>
<tr>
<td>6</td>
<td>Automatic fire sprinkler system</td>
<td>NZS 4541</td>
</tr>
<tr>
<td>7</td>
<td>Automatic fire sprinkler system with smoke detection and alarm system</td>
<td>NZS 4541, NZS 4512</td>
</tr>
</tbody>
</table>
Figure 2.1 Systems throughout a building
Paragraph 2.2.3

Acceptable Solution C/AS2

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More than one risk group on a floor

2.2.4 If there is more than one risk group on one floor level, the fire safety requirements will depend on whether the risk groups occupy the same firecell, or whether the floor is divided by fire separations into different firecells.

Comment:
Refer to Paragraphs 2.2.1 to 2.2.3 for the requirements for individual firecells in this risk group.

2.2.5 Where fire separations are not needed between different risk groups on the same floor level, the fire safety systems adopted for the whole floor level shall be those of the primary risk group (as defined in Paragraph 1.2.2).

2.2.6 The fire safety systems required by Paragraph 2.2.3 shall be interconnected to alert all occupants of that floor level in the event of fire.

Comment:
Refer to Paragraphs 2.2.7 and 2.2.8 for the requirements for other floor levels in the building.

Multi-unit dwellings

2.2.10 For low-rise buildings that have no more than two levels (one household unit above another), and where each household unit has its own escape route that is independent of all other household units, and that contain only risk group SM, then the requirements of risk group SH shall apply (see C/AS1).

2.2.11 If any upper floor, of a building containing other risk groups, contains risk group SM, all floors below shall have a smoke detection system (Type 4 or Type 5) which shall activate alerting devices in all sleeping areas within the building. If the lower risk group contains uses where smoke detection is unsuitable heat detectors may be used in lieu.

Other floors in a building

2.2.7 The alarm systems required in a building shall be interconnected to alert all building occupants in the event of fire except:

a) In areas that have the local smoke component of a Type 5 system, and

b) DELIBERATELY LEFT BLANK.

Same risk group on different floors

2.2.8 Where firecells containing the same risk group occur at different levels in the same building, the fire safety systems for the firecell having the most onerous requirements shall be applied to all firecells in that risk group.

Boarding houses/bed and breakfast

2.2.9 As permitted by NZBC A1 2.0.2, a detached dwelling used as a boarding house accommodating up to five people (not including members of the residing family) can be treated as risk group SH (see C/AS1).
2.3 Fire resistance ratings

FRR values

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

*Life rating* = 60 minutes

*Property rating* = 60 minutes.

Comment:
Throughout this Acceptable Solution, minimum FRRs are specified for particular situations. It is therefore essential to check for specific requirements.

Structural elements in a single storey building need not be fire rated if FRRs are not required for any other reason.

2.3.2 If a Type 7 system is provided, the fire ratings for risk group SM shall be:

*Life rating* = 30 minutes, and

*Property rating* = 30 minutes.

2.3.3 If there is more than one risk group on one floor in the building, the highest required FRR shall be applied to common spaces and shared escape routes for that floor level.

General requirements for FRRs

2.3.4 FRRs shall apply to the sides of primary and secondary elements which are exposed to fire.

2.3.5 When different FRRs apply on each side of a fire separation, being a wall, the higher rating shall apply to both sides.

2.3.6 Floors shall have an FRR for exposure from the underside.

2.3.7 The FRR of a primary element integral with a fire separation shall be no less than that of the fire separation.

2.3.8 Except as required by Paragraph 2.3.9, areas of external wall not permitted to be unprotected areas shall be rated for fire exposure from within a firecell.

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

a) Walls are within 1.0 m of the relevant boundary, or

b) The building height is more than 10 m, or

c) The final exit is two or more floor levels below any risk group SM occupancy.

2.3.10 Building elements shall have an FRR no less than that of any building element to which they provide support within the firecell or in any adjacent firecell.

2.3.11 Structural framing members connected to building elements with an FRR shall be rated at no less than the elements to which they are connected, or alternatively their connections and supports shall be designed so that their collapse during fire will not cause collapse of the fire rated elements.

Applying insulation component in FRR

2.3.12 Insulation ratings shall apply to:

a) All fire separations, except as noted in Paragraph 2.3.13, and

b) Parts of external walls that are not permitted to be unprotected areas, and

2.3.13 Insulation ratings are not required to apply to:

a) Glazing installed in accordance with Paragraph 4.2, or

b) All elements where sprinklers are installed throughout the building, in accordance with either NZS 4541 or NZS 4515 as appropriate, or

c) Fire stops in accordance with Paragraph 4.4.5, or

d) Fire dampers and damper blades in accordance with Paragraph 4.16.12, or

e) Fire resisting glazing in accordance with Paragraph 5.4.3.
3.1 General principles

3.1.1 All buildings shall have means of escape from fire which include escape routes. An escape route (see Figure 3.1) shall provide protection to any occupant escaping to a safe place from a fire within a building.

3.1.2 The components of an escape route, in ascending order of protection, are the open paths, exitways (these may comprise smoke lobbies and safe paths), and final exits (see Figure 3.1). Two or more of these components will be necessary, depending on the total travel distance. An escape route shall not pass from a higher to lower level of protection in the direction of escape.

3.1.3 Provided the allowable lengths of open paths are not exceeded, an escape route may comprise only an open path and final exit.

3.1.4 Escape routes shall comply with NZBC D1. Ramps, stairs, ladders, landings, handrails, doors, vision panels and openings shall comply with Acceptable Solution D1/AS1.
Note:
The final exit is where the escape route enters a safe place. This might be beyond the exit door from the building.
3.2 Number of escape routes

3.2.1 Except where Paragraph 3.13 allows the use of single escape routes, every occupied space in a building shall be served by two or more escape routes (see Figure 3.2).

3.2.2 The minimum number of escape routes from a floor level, except in those situations where single escape routes are permitted (see Paragraph 3.13), shall be as specified in Table 3.1.

### Table 3.1 Minimum number of escape routes from a floor level

<table>
<thead>
<tr>
<th>Number of occupants</th>
<th>Minimum number of escape routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 100</td>
<td>2</td>
</tr>
<tr>
<td>Up to 200</td>
<td>3</td>
</tr>
<tr>
<td>Up to 300</td>
<td>4</td>
</tr>
</tbody>
</table>

3.3 Height and width of escape routes

**Height**

3.3.1 Height requirements within escape routes shall be as follows:

a) The clear height shall be no less than 2100 mm across the full width, except that isolated ceiling fittings not exceeding 200 mm in diameter may project downwards to reduce this clearance by no more than 100 mm, and

b) Any door opening within, or giving access to, any escape route shall have a clear height of no less than 1955 mm for the required width of the opening.
Width

3.3.2 Width requirements within escape routes shall be as follows:

a) **Width of all available escape routes:** the total combined width of all available escape routes shall allow 7 mm/person for horizontal travel and 9 mm/person for vertical travel.

b) **Not an accessible route or accessible stair:** if the escape route is not an accessible route or accessible stair, it shall have a minimum width of 850 mm for horizontal travel and 1000 mm for vertical travel, except in the following cases:
   
i) if an escape route is within an exitway, its width shall be no less than 1000 mm, and
   
ii) if there is no requirement for people with disabilities, the occupant load is less than 50 and the escape route is within an open path, its width may be reduced to 700 mm for horizontal travel and 850 mm for vertical travel.

c) **Accessible routes and accessible stairs:** if the escape route is an accessible route or accessible stair, it shall have a minimum width of 1200 mm for horizontal travel and 1100 mm for vertical travel.

d) **Provision for unusable escape routes:** except where dead ends and single escape routes are permitted, in unsprinklered firecells the total required width shall still be available should the widest of the escape routes be unusable due to the location of the fire or any other reason (see Figure 3.3).

Comment:
Requirement d) may be achieved either by providing additional escape routes or by making the minimum required number wider.

e) **Sprinkler concession:** if the firecell is sprinklered, requirement d) does not apply (i.e., it is not necessary to provide extra width to allow for the possibility that one escape route may be unusable).

f) **Horizontal escape route with a single direction of escape:** this shall be wide enough at any point to take the full occupant load from all contributing occupied spaces. However, the escape route may have its width increased progressively as it passes the exit from each occupied space (see Figure 3.4).

---

**Figure 3.3** Exitway widths in unsprinklered firecells

Paragraph 3.3.2 d)

Exitways A and B each wide enough to take the full occupant load.

The combined width of the two narrowest exitways shall be sufficient to take the full occupant load.
g) **Horizontal escape route with two directions of escape**: this shall have sufficient width for the full length of the route to allow for the *occupant load* from all contributing *occupied spaces*. However, this shall not apply if the requirements of Paragraph 3.7.13 e) are met for escape through adjacent firecells.

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*).

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.

j) **Marae buildings using traditional Māori construction materials**: where applying the exception permitted in Paragraph 4.17.6 i), the *escape route* widths required by Paragraph 3.3.2 b) shall be doubled.

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.
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.

Curved and spiral stairs

3.3.5 If curved or spiral stairs form part of an escape route, the required width shall be that described as ‘walking area’ in Acceptable Solution D1/AS1.

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 and 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 total open paths, 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 SM

<table>
<thead>
<tr>
<th></th>
<th>No system and Type 2 system</th>
<th>Type 4 and Type 5 system</th>
<th>Type 6 system</th>
<th>Type 7 system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead end open path</td>
<td>20 m</td>
<td>30 m</td>
<td>30 m</td>
<td>40 m</td>
</tr>
<tr>
<td>Total open path</td>
<td>50 m</td>
<td>75 m</td>
<td>75 m</td>
<td>100 m</td>
</tr>
</tbody>
</table>

If open path 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 firecell shall be protected with smoke detectors. Heat detectors cannot be substituted for smoke detectors in exitways.

If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire Service connection is not required.

Open paths

3.4.2 When determining open path lengths, including any dead end, the following shall apply:

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 specified in Table 3.2 apply to risk group SM. 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 and fittings: allowance shall be made for the travel distance around obstructions such as furniture, fittings and office equipment located in the open path (see Figure 3.7 a). If the location of such obstructions is not known, 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) Marae buildings using traditional Māori construction materials: when applying the exception permitted in Paragraph 4.17.6 i), the permitted length of the open path specified in Table 3.2 shall be halved, and

f) Termination: an open path ends either at:
   i) the start of an exitway, or
   ii) 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).
**Intermediate floors**

**3.4.3** On intermediate floors (see Figure 3.8), the open path length, for compliance with Table 3.2, shall be taken as 1.5 times the measured length. However, the length as measured in accordance with Paragraph 3.4.2 c) may be used if the intermediate floor is a smokecell and an escape route is available from the intermediate floor without passing through any lower space in the same firecell.

**Comment:**
People on an intermediate floor may be exposed to smoke at an earlier stage than people on a full floor. Reduced open path travel distances mean reduced exposure time to smoke from the fire.

**Stairs and ladders**

**3.4.4** Stairs and ladders occurring in an open path (see Figure 3.9) shall have their open path length taken as:

a) **For straight and curved stairs:** the plan length measured on the stair centreline multiplied by 1.2, plus the plan length of each landing

b) **For spiral stairs:** twice the vertical height, and

c) **For ladders:** three times the vertical height.

**Comment:**
It is acceptable to use two spiral stairs as part of the escape routes from such situations as an intermediate floor down to the firecell floor. Likewise, where ladders are permitted to serve such situations as the fly-tower of a theatre, two ladders may be used as the escape routes.
3.4.5 The open path length permitted by Table 3.2 shall be reduced by 50% in any space where the following conditions apply:

- Both the floor and the ceiling slope in the same direction at an angle of more than 4° from the horizontal, and any escape route from the space is up the slope, and
- The clear ceiling height at any point is less than 4.0 m, and
- The occupant load in the space is more than 50, and
- The space is unsprinklered.

Comment:
People in a space with a sloping floor and ceiling will be exposed to smoke at an earlier stage than people in a space with a flat ceiling. This can create a problem when the direction of escape is up the slope. Reduced travel distances mean reduced exposure time to the smoke from the fire.

Escape through adjoining building

3.4.6 An escape route may be via an adjoining building (see Figure 3.10), provided the following conditions are satisfied:

- The escape route through the adjoining building meets all escape route requirements for the occupant load from the fire affected building requiring to use that route, and

Comment:
It is not necessary for the escape route to be wide enough to carry the combined occupant load from both buildings.
b) Unless the escape route passes directly to a safe path in the adjoining building, access shall be through a smoke lobby before passing through the external walls, and
c) The opening through the external wall having the higher FRR has a fire door with an FRR of no less than that wall, and
d) Escape routes in the adjoining building comply with the Building Code and have sufficient capacity to carry the occupant load from the building or buildings being evacuated, and
e) The escape route does not re-enter the first building at any point, and is freely available at all times.

Comment:
An escape route of this type depends on a permanently-binding legal agreement between different owners, tenants or occupiers.

If the escape routes in the adjoining building comply with this Acceptable Solution, they shall have sufficient capacity to provide for the maximum number of occupants in any firecell. Clearly, the escape routes must be sized for the largest number using them in either building but not both. This situation should present no great problem when the adjoining building is, and will remain, under the same ownership or management control as the original building. However, problems may arise when the ownership, management, or use of the adjoining building changes. This can and does happen, particularly when the adjoining building is an existing building or part of it is sold under an arrangement such as the Unit Titles Act. In such cases, approval should be dependent on the provision of a legal agreement and perhaps a caveat on the title. This ensures that the dependence on the means of escape from fire will not be affected by subsequent events.

3.5 Escape from basements

3.5.1 Except in cases where there are two or more escape routes serving only the basement firecells and each terminates in a safe place, safe paths serving basement firecells shall be preceded by a smoke lobby that shall have a plan area in accordance with Paragraph 3.9.2.

Single escape routes

3.5.2 A single escape route and final exit is acceptable from basements (see Figure 3.11) where, in addition to the requirements of Paragraph 3.13.1 and the smoke lobby requirements of Paragraph 3.5.1, there are no more than two basement floor levels.

3.6 Open paths

3.6.1 Open paths shall satisfy the specific requirements of Paragraphs 3.6.2 and 3.7 where they apply to a particular building.

Open path separation

3.6.2 If two or more open paths are required, they shall be separated from each other, and remain separated until reaching an exitway or final exit (see Figure 3.12). Separation shall be achieved by diverging (from the point where two escape routes are required), at an angle of no less than 90° until separated by:

a) A distance of 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.

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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 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.

Open paths via unenclosed stairs

3.7.3 Unenclosed stairs (stairs which are not smoke or fire separated from other spaces) in escape routes, other than those within a household unit, shall not exceed a height of 4.0 m within the firecell. Where the height exceeds 4.0 m, the escape route from that level shall be a safe path until it reaches a final exit.

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3.7.5 THIS PARAGRAPH DELIBERATELY LEFT BLANK

3.7.6 THIS PARAGRAPH DELIBERATELY LEFT BLANK
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.
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:

a) Where two or more escape routes are required from that firecell, only one escape route shall be via the intermediate floor, and

b) 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

c) 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 THIS PARAGRAPH DELIBERATELY LEFT BLANK

3.9 Exitways

3.9.1 Exitways consist of smoke lobbies and safe paths.

Smoke lobbies – floor area

3.9.2 If a smoke lobby is required preceding a vertical safe path (see Paragraphs 3.5.1, 3.9.3 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 shall be 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.
Smoke lobbies – exitways from upper and intermediate floors

3.9.3 Entrances to vertical safe paths shall be preceded by smoke lobbies (refer to Paragraph 3.9.2 for the required area of the smoke lobby) except where:

a) The safe path from an upper floor or intermediate floor serves only that floor, or
b) The firecell is sprinklered, or
c) The occupant load of the firecell is less than 150, or
d) The vertical safe path is preceded by a horizontal safe path.

Comment:
An upper floor is any floor above final exit level.

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 appropriate construction (see Paragraph 3.11).

3.9.6 Except where the conditions for escape via an external escape route (see Paragraph 3.11) or successive open paths (see Paragraph 3.7.13) apply, exit doors from sleeping area firecells shall open directly onto:

a) A horizontal safe path, or
b) A final exit.

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.

Safe path termination

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

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

Comment:
Long safe path corridors may be required to be subdivided by smoke separations (see Paragraph 4.12). A vertical safe path may be required to have mid-height smoke separation (see Paragraph 4.9.7).

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.

Special conditions for risk group SM

3.9.11 Smoke separation in safe paths shall comply with the requirements of Paragraphs 4.9.6 to 4.9.7.

Table 3.4 Travel distances on horizontal safe paths

<table>
<thead>
<tr>
<th></th>
<th>No system and Type 2 system</th>
<th>Type 4 and Type 5 systems</th>
<th>Type 6 system</th>
<th>Type 7 system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single direction</td>
<td>25 m</td>
<td>40 m</td>
<td>40 m</td>
<td>50 m</td>
</tr>
<tr>
<td>Two or more directions</td>
<td>180 m</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

If open path length increases for a Type 4 system are being applied, where Acceptable Solution F7/AS1 allows heat detectors to be substituted for smoke detectors, not less than 70% of the firecell shall be protected with smoke detectors. It is not permitted to substitute the smoke detection in exitways.

If smoke and heat detection systems are installed in order to extend permissible travel distance in accordance with this table and are not a requirement of Paragraph 2.2.1 then Fire Service connection is not required.
3.10 Control of exitway activities

3.10.1 Exitways shall not be used for:

a) Any storage of goods, solid waste or solid waste containers, or
b) Entry points to solid waste chutes, or
c) The location of furniture or other combustibles, or
d) Storage of cloaks or linen, or
e) A cleaner’s cupboard not fire separated from the exitway, or
f) The location of an electrical switchboard or similar, or
g) Any activity (other than as permitted by Paragraph 3.10.2).

3.10.2 Some activities are permitted in an exitway if:

a) An alternative escape route is available from all firecells served by the safe path in which the activities occur, and
b) 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
c) The escape route is not impeded by the activity or the occupants involved in that activity, and
d) Those activities:
   i) are visible to users of the exitway, except in the case of sanitary fixtures
   ii) exist only to provide support functions to the activities of the risk group served by the exitway
   iii) 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), apartment mail boxes, tourist information and toilet facilities.

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 car 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 landings located in open paths (see Figure 3.17) shall either be within a smokecell separated from all other areas or have lift landing doors with smoke control capability. This requirement does not apply if the building is protected with a Type 7 system or the lift shaft has a pressurisation system designed to AS/NZS 1668.1. The lift doors 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.

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.
Figure 3.17 Lifts and smoke lobby on open path
Paragraph 3.10.4

Lifts occupants shall not egress through smoke separation either smoke separation to be provided or lift pressurisation system lift smoke separation to be separate from escape route

Unsprinkled compartment

FRR = Life rating

A: Smoke cell

B: Lift doors with smoke control capability

NOTE: Either A or B required

Acceptable Solution C/AS2

Figure 3.17A Lifts and smoke smoke separations when landing on an unsprinklered horizontal safe path
Paragraph 3.10.5

HSP = Horizontal safe path

occupants shall not egress through smoke separation

* either smoke separation to be provided or lift pressurisation system
* lift smoke separation to be separate from escape route

Amend 3 Jul 2014
**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.

**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 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) If there is only one direction of escape, roofs and external walls with no unprotected areas closer to an external escape route than:

   i) 2.0 m if unsprinklered (see Figure 3.18), or
   
   ii) 1.0 m if all firecells passed by the external escape route are sprinklered, or

**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.
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 THIS PARAGRAPH DELIBERATELY LEFT BLANK

3.11.4 If the distance separating external walls or roofs from an external dead end escape route is less than permitted by Paragraph 3.11.2, those walls and roofs shall comply with the FRR requirements of Paragraph 5.3 and Paragraphs 5.7.3 to 5.7.5. Glazing shall comply with Paragraph 4.2. The FRR shall be in accordance with Paragraph 2.3.

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), or

c) Where household units and suites have full height glazing adjacent to a balcony which may be the only means of access and egress. The balcony shall provide the occupants with more than one escape route from the exit door, enabling them to escape without passing a unit containing a fire.

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).

d) DELIBERATELY LEFT BLANK
Separation by fire rated construction

3.11.6 Except where the separation distance requirements of Paragraphs 3.11.2 a) or 3.11.5 are achieved:

a) External walls and roofs adjacent to external escape routes shall comply with the FRR requirements of Paragraphs 5.3 and 5.7 and have no unprotected areas, except that glazing for safe paths complying with Paragraph 4.2 shall be permitted, and

b) If the escape route is a balcony with a single direction of escape, and the vertical distance between the underside of the balcony and the closest unprotected area in the external wall below is less than 5.0 m (see Figure 3.19), balcony barriers shall:

i) have no openings, and
ii) be protected with a material having a Group Number of no greater than 2, and

c) If the vertical separation between the underside of an external escape route and unprotected areas in the external wall below is less than 5.0 m:

i) the floor of an external escape route closer to an external wall than required by Paragraph 3.11.2 shall have an FRR of no less than required by Paragraph 2.3, and
ii) treads and risers of stairs on external escape routes shall either be constructed from a material which has a critical radiant flux of no less than 2.2 kW/m² or shall be protected on the underside with a material having a Group Number of no greater than 2, and

d) If the escape route comprises external horizontal and internal vertical safe paths, a smoke separation shall be provided between them.

Ventilation openings

3.11.7 The open area of a balcony or bridge shall be no less than 50% of the balcony floor area, and shall be evenly distributed along the open sides and any approach ramp (see Figure 3.19). Where an escape route on a balcony is served by an open stairway, similar ventilation shall be provided on the stairway. Open sides shall not be enclosed above a height of 1100 mm from the floor, except that a fixed open grille may be used if it provides the required free air space.

Barriers

3.11.8 Changes in exitway floor level other than in the direction of travel shall have barriers that comply with Acceptable Solution F4/AS1.

Open air auditoriums

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3.13 Single escape routes

3.13.1 Single escape routes shall only be permitted if:

a) The open path length does not exceed the limits specified in Table 3.2, and
b) The total occupant load from all firecells on each level served by the escape route is no greater than 50, and
c) The number of people with disabilities on any floor is not greater than 10, and
d) The escape height is no greater than:

i) 10 m if unsprinklered, or
ii) 25 m if sprinklered, and
e) In buildings with two or more floors, the vertical safe path is preceded by a smoke lobby on all floors except the topmost floor (refer to Paragraph 3.9.2 for sizing of the smoke lobby), and
f) There are no more than two basement levels below ground and the vertical safe path from the basement levels is preceded by a smoke lobby (see Figure 3.11).
3.13.2 A single escape route from the firecell is permitted provided that, in addition to the requirements of Paragraph 3.13.1:

a) The escape route within each firecell terminates at a final exit or opens onto a safe path which complies with the requirements of Paragraphs 3.9.4 to 3.9.11, and

b) The particular requirements for stairways, balconies and split level exitways, given in Paragraphs 3.7.3 and 3.13.3 to 3.13.5, are satisfied, and

c) The length of any safe path on a floor does not exceed the maximum dead end length permitted by Table 3.2.

Balconies, bridges and external stairways

3.13.3 balconies, bridges and external stairways (see figure 3.20) may be part of a single external escape route where:

a) The escape height is no greater than 16 m if unsprinklered, or 25 m if sprinklered, and

b) The escape route on the balcony, bridge and stairway meets the requirements of Paragraph 3.11 for protection, construction and ventilation, and

c) The length of any bridge between the external wall and stairway is no less than 3.0 m.

Split level exitway

3.13.4 Where a building is effectively of single storey construction but contains individual household units at slightly different levels (see Figure 3.21), a single internal escape route is permitted provided that:

a) The escape route is a safe path leading directly to a final exit, and

b) The difference in floor level between the final exit and any exit from a household unit is not greater than 2.0 m.

3.13.5 Where the level difference is greater than 2.0 m the relevant provisions for stairs (see Paragraphs 3.13.2 and 3.13.3) shall apply.

3.14 Special conditions

3.14.1 Safe paths may also serve other risk groups where:

a) A single escape route complying with Paragraph 3.13 is permitted, or

b) Alternative escape routes which are safe paths are provided.

These requirements shall also apply to all firecells on lower floors using the same escape routes.
Paragraph 3.14.3

Acceptable Solution C/AS2

Figure 3.20 Single escape routes – direct access to balcony and stairway

Paragraph 3.14.3

External walls adjacent to the safe path shall be fire separations, or where there are unprotected areas of external wall, the safe path shall be separated by distance (see Paragraph 3.11)

Single safe path open balcony and external stairway

Firecells

Ventilation requirements to open stairway are the same as for balconies, see Paragraph 3.11.7

Escape height no greater than 16 m or 25 m if sprinklered

Where the vertical separation between the underside of the balcony and the closest unprotected area in the external wall below is less than 5.0 m, barriers shall have no openings and be protected by a material having a Group Number of no more than 2, (see Paragraph 3.11.6 (b))
3.15 Doors subdividing escape routes

Door closers and latching

3.15.1 Except as permitted by Paragraph 3.15.7 (revolving doors, automatic doors and access control systems), doors on escape routes shall satisfy the following requirements:

a) They shall be hinged or pivoted on one vertical edge only, except that sliding doors may be used where the space, including an exitway, has an occupant load of less than 20. Roller shutter doors or tilt doors shall not be used as escape route width except in an intermittently occupied space where the roller shutter door is the only access route and is open at all times the space is occupied, and

b) Fire and smoke control doors shall be self-closing, and the self-closing device shall either be:

i) active at all times, or

ii) activated by releasing a hold-open device in response to operation of a smoke detector (see Paragraph 3.15.10), or

iii) a self-closer that is activated by operation of a smoke detector but allows the door to swing freely at other times. The smoke detector requirements shall be the same as for a hold-open device (see Paragraph 3.15.10), and

c) If such doors are required to be secure, they shall be fitted with simple fastenings that can be readily operated from the direction approached by people making an escape complying with Paragraph 3.15.14, and
d) They shall not be fitted with any locking devices unless these comply with Paragraph 3.15.2, and

e) They shall have door handles which satisfy the requirements of Acceptable Solution D1/AS1 for use by people with disabilities, and

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 fastenings 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:
   
   i) 725 mm into horizontal *safe paths*, or
   
   ii) 875 mm within horizontal *safe paths* and 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*, and

**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).

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**Figure 3.22** Degree and width of openings

Paragraphs 3.3.6 d) and 3.15.5

- The door assembly may reduce the width of the escape route by no more than 125 mm
- Minimum clear opening width in open paths is 600 mm or 760 mm on an accessible route
- Door opens no less than 90°
- No change in floor level within the area outlined and across the full width of the escape route
- The floor area extends for a distance of no less than the arc of the door swing
- The floor area is at the same level on both sides of the door for the full width of the escape route
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.
Figure 3.24 Revolving and automatic sliding doors

Paragraph 3.15.7

(b) SLIDING DOORS

Relying doors are permitted across an open path or final exit provided they are constructed to fail safely in an emergency. Revolving doors are not allowed across an escape route leading to or within an exitway.

Alternatively outward opening doors shall be provided immediately adjacent to the revolving doors.

(a) REVOLVING DOORS

Position of sliding doors after the easily openable emergency procedure.

Dotted position of sliding doors when open normally or in the failed safety position.

Escape route.
**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 1000, 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.

3.15.10 Detectors for releasing hold-open devices shall be smoke detectors which are:

a) Integral with the hold-open device and comply with Appendix C, or

b) Located on the ceiling adjacent to the doorset on both sides of the doorset, or

c) Part of an automatic smoke detection system on both sides of the doorset.

**Delayed action unlocking devices**

3.15.11 Delayed action unlocking devices on escape routes shall be installed only if:

a) The firecell is protected by a Type 4 or Type 7 system, and

b) Fire alarm activation instantly overrides any delay, and

c) The delay in operation does not exceed 15 seconds, and

d) Signage warning of the delay in operation and complying with NZBC F8.3.1 is provided.

Comment:

A delayed action unlocking device is a security mechanism that allows a door to be unlocked without the use of a key, but does not release the door under non-emergency conditions until after a time delay has elapsed. The time delay allows the person intending to use the door to be checked for security reasons.

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**Simple fastenings**

3.15.14 Doors on escape routes (whether or not the doors are fire doors) shall be fitted with simple fastenings that can be easily operated from the direction from which people approach when making their escape.

Comment:

This generally excludes the use of keyed locks and bolt fastenings, see Paragraph 3.15.2 for security and safety.

3.16 **Signs**

3.16.1 All escape routes, fire doors and smoke control doors shall have signs complying with NZBC F8.
Part 4: Control of internal fire and smoke spread

4.1 Firecells

4.1.1 Firecells shall be fire separated from each other by the life rating specified in Paragraph 2.3 of this Acceptable Solution if the firecell is categorised in risk group SM, or by the higher of the two life ratings if it is categorised in another risk group (see Paragraph 2.3 of the relevant Acceptable Solution to determine that life rating).

Comment:
All firecells must be fire separated from one another. Also, within sleeping risk groups, Paragraph 4.6 contains requirements for certain activities to be fire separated and for fire separations to limit the number of occupants in a firecell.

4.2 Glazing in fire and smoke separations

4.2.1 Glazing in fire separations shall be fixed fire resisting glazing having the same FRR values for integrity as the fire separation.

4.2.2 Uninsulated fire resisting glazing having the same integrity value as the fire separation is permitted in external walls in accordance with Paragraph 5.4.

4.2.3 There is no restriction on the area of glazing in smoke separations (including smoke lobbies). Non-fire resisting glazing may be used if it is toughened or laminated safety glass. Glazing shall have at least the same smoke-stopping ability as the smoke separation.

Fire doors and smoke control doors

4.2.4 Glazing in fire doors shall be fire resisting glazing having the same integrity value as the door. If the door requires an insulation value, an uninsulated vision panel may be used without downgrading the insulation value of the door. Vision panels shall comply with NZS 4520.

4.2.5 Glazing in smoke control doors shall meet the requirements for smoke separations.
4.3 Structural stability during fire

Stability of building elements having an FRR

4.3.1 To avoid premature failure, this Acceptable Solution requires the structural stability of primary building elements with an FRR to be retained for the duration of that FRR. Primary elements, located entirely within a firecell and providing support to fire separations, may need to be evaluated for fire exposure from multiple sides simultaneously.

Comment:
This situation arises when a primary element, such as a column or wall, located entirely within a firecell, provides lateral support to a firecell boundary wall or vertical support to the firecell floor/ceiling. Results against the standard furnace tests for fire resistance may not be suitable as they commonly relate to exposure from one side only. Separate evaluation is required to assess the performance of primary elements when exposed to fire from more relevant sides simultaneously.

4.3.2 During a fire, primary elements shall resist collapse under:

a) The design dead and live loads required by NZBC B1, and

b) Any additional loads caused by the fire.

Comment:
NZBC B1.3.3 (c) and (i) requires that structural stability take account of vertical and horizontal loads, temperature and fire effects.

Additional loadings can arise from changes in length or other deformations in building elements as a result of high temperatures.

Yield strength of most materials generally reduces with temperature increase, so that strength reduction is related to the time for which the primary element is exposed to fire. Factors which need to be taken into account include the maximum temperature attained, the capacity of the element to absorb heat, potential loss of section, the degree of exposure, whether any applied coating is used to protect the element from the effects of fire, and the degree of restraint provided by the surrounding structure.

Unrated primary elements permitted

4.3.3 In many cases primary elements are rated for structural adequacy, and sometimes for integrity and insulation. However, primary elements need not have an FRR where any of the following circumstances exist:

a) They are located outside an external wall which is 2.0 m or more from the relevant boundary, and are shielded from the effects of fire by protected areas of the wall (see Figure 4.1)

b) They are added to strengthen an existing building and are required only to carry horizontal loads induced by wind or earthquake.
Providing vertical stability

4.3.4 Building elements required to have an FRR shall have their vertical stability provided in one or more of the following ways:

a) Primary elements in a vertical orientation (e.g., walls and columns) shall be rated for structural adequacy.

b) Primary elements in a horizontal orientation (e.g., floors and beams) shall be supported by primary elements with at least an equivalent structural adequacy rating.

Providing horizontal stability

4.3.5 Building elements required to have an FRR shall have their horizontal stability provided in one or more of the following ways:

a) Be cantilevered from a structural base having an FRR of no less than that of the building element concerned

b) Be supported within the firecell by other building elements having an FRR of no less than that required for the element being supported. The structural adequacy and diaphragm action of supporting building elements, located entirely within a single firecell, must be assessed when exposed to fire from all relevant sides simultaneously.

c) Be supported by primary elements outside the firecell.

Comment:

It is assumed that fire will be restricted to the firecell of origin at least for the time required by the property rating of the primary element concerned.

The stability to a beam or fire separation may, for example, be provided by beam or diaphragm action of a floor or wall which is rated only for structural adequacy.

A standard test for fire resistance commonly exposes fire separations from one side only and may not be a suitable measure for determining the structural adequacy of a building element when exposed to fire from more than one side simultaneously.
4.4 Fire stopping

Introduction

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

Fire stops

4.4.2 Fire stops shall have an FRR of no less than that required for the fire separation within which they are installed, and shall be tested in accordance with Appendix C C5.1.

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

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

Comment:
There are many types of fire stops (e.g., mastics, collars, pillows), each designed to suit specific situations. A fire stop is appropriate for a particular application if it passes the test criteria when installed as proposed.

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

4.5 Firecell construction

Each of the building elements enclosing a firecell is permitted to have a different FRR, as this rating will depend on the characteristics of the firecell, the reason for the FRR, and the risk groups contained on either side of any fire separation.

Comment:
An FRR of zero may apply to some walls and most roofs.

4.5.2 Except where intermediate floors are permitted, each floor in a multi-storey building shall be a fire separation.

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

a) For closures such as doorsets, and
b) Penetrations complying with Paragraph 4.4, and
c) For glazing permitted by Paragraph 4.2.

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

Junctions of fire separations

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

4.5.6 Where one fire separation is a wall and the other a floor, the wall/floor junction shall be constructed with the FRR required for the higher rated element.

Junctions with roof

4.5.7 Vertical fire separations and external walls shall either:

a) Terminate as close as possible to the external roof cladding and primary elements providing roof support, with any gaps fully fire stopped (see Figures 4.2 and 4.3), or
b) Extend not less than 450 mm above the roof to form a parapet.
Ceiling space firecells

4.5.8 Large roof or ceiling spaces may be constructed as separate firecells above more than one occupied firecell provided that the ceiling is a fire separation rated from below. In this situation, vertical fire separations in the firecell below need terminate only at the ceiling.

Sealing of gaps

4.5.9 To avoid the passage of smoke through fire and smoke separations, gaps shall be sealed with fire resistant materials complying with AS 1530.4 in their intended application if they are located:

a) In smoke separations, and between smoke and fire separations
b) Around glazing in smoke separations
c) Between fire or smoke separations and unrated parts of external walls.

4.5.10 Gaps around penetrations shall be fire stopped (see Paragraph 4.4).

4.6 Specific requirements for sleeping areas

Group sleeping areas

4.6.1 Group sleeping areas shall be fire separated from each other and from non-sleeping areas. Fire separations between group sleeping areas and non-sleeping areas, and between adjacent group sleeping areas, shall have an FRR in accordance with Paragraph 2.3. Each group sleeping area firecell shall contain no more than 40 beds if unsprinklered, or 160 beds in firecells which are sprinklered.

Comment:
In this Acceptable Solution, the term ‘beds’ is used to denote the number of people expected to be sleeping in the firecell. Therefore, a double bed counts as two beds and a tier of three separate bunks (one above another) counts as three beds.

Group sleeping areas of up to 40 beds might include accommodation such as ski lodges or school dormitories. Larger bed numbers, up to the 160 maximum, would apply to group gatherings in a wharenui or a sleep-over for students in a school hall.
4.6.2 A group sleeping area firecell may be subdivided provided that:

a) The firecell contains no more than 40 beds, whether or not sprinklers are installed, and

b) There is a gap of no less than 400 mm between the top of all partitions and the underside of the roof or ceiling. The partitions need not be fire rated.

4.6.3 Intermittently occupied spaces, such as tea bays and sanitary facilities, which provide direct support functions to the sleeping area may be included in a group sleeping area firecell.

4.6.4 Spaces such as storerooms, laundry facilities, communal kitchens, dining rooms and lounges shall be separated from group sleeping areas with fire separations having an FRR in accordance with Paragraph 2.3. It is acceptable for these non-sleeping activities to share a common firecell.

Suites

4.6.5 A sleeping area may be subdivided into separate suites (such as a motel unit or hotel room with or without ensuite facilities). Each suite shall be a separate firecell and contain no more than 12 beds. Fire separations between adjacent suites on the same floor level shall have an FRR in accordance with Paragraph 2.3.

Comment:
It is implicit that, within a suite, there is a substantial degree of responsible self-regulation by the occupants. Where there are two or more occupants, it is expected that the social cohesion of the group would result in a mutual responsibility for warning each other of a fire within a suite.

4.6.6 Service vehicle and unloading areas within the perimeter walls of a building containing risk group SM shall meet the requirements of Acceptable Solution C/AS7.

Comment:
Service vehicles include commercial vehicles such as delivery vans, refuse pick-up vehicles.

Halls and wharenui

4.6.7 A hall or wharenui used for sleeping, even if only occasionally, shall be classified as a group sleeping area risk group SM.

Comment:
See Paragraph 3.3.2 j) which requires wider escape routes and Paragraph 3.4.2 e) which requires shorter open path lengths where traditional Māori construction materials are used that do not comply with surface finish requirements.

Paragraphs 4.6.1 and 4.6.2 limit the maximum numbers permitted to sleep in a group sleeping area such as a wharenui.

Household units

4.6.8 Every household unit shall be a single firecell separated from every other firecell by fire separations having an FRR in accordance with Paragraph 2.3.

Comment:
Where the building is separated into unit titles, the requirements of Paragraph 5.1.1 a) apply.

4.6.9 An individual household unit may contain one or more upper floors provided that the open path length provisions of Table 3.2 are satisfied.

4.6.10 Where a vehicle parking garage is provided solely for the use of the occupants of an individual household unit, it is acceptable for that garage to be included within the household unit firecell. However, where garaging is provided for vehicles of occupants of more than one household unit, that space shall be a separate firecell complying with the requirements of Acceptable Solution C/AS7.

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4.9 Exitways

4.9.1 Exitways, unless external and separated by distance, shall comprise smoke lobbies in accordance with Paragraph 3.9.2 and/or 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.

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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4.10 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, 4 or 5 system, and

c) Its floor level no lower than the ground level outside the external wall if gas is the energy source.

Vertical safe path smoke separation

4.9.7 Vertical safe paths which exceed a height of 25 m shall be divided by smoke separations and smoke control doors at the landing nearest mid-height. This requirement does not apply if the building is sprinklered.
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.

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 shall apply 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).
Openings in protected shafts

4.11.4 There shall be no openings in protected shafts except for:
   a) Access panels having an FRR of no less than that required for the shaft
   b) Doorsets providing access to lifts and complying with smoke control requirements
   c) Openings for lift ropes passing into a lift motor room, which shall be as small as practicable
   d) Fire dampers serving a ventilation duct and complying with requirements for fire resisting closures
   e) Penetrations which satisfy Paragraph 4.4 for fire stopping, or
   f) Fittings with an FRR of no less than that required for the shaft.

Solid waste and linen chutes

4.11.5 Solid waste and linen chutes which pass from one firecell to another shall be protected shafts or contained within a protected shaft. If the building is unsprinklered, each chute shall be equipped with automatic sprinkler heads connected to any water supply pipe capable of meeting the minimum design criteria for the selected sprinkler head. These sprinklers shall be installed at the top of each chute and in the space into which the chute discharges. The minimum residual pressure in the water supply pipe shall be 50 kPa with two sprinkler heads operating.

Comment:
The minimum residual pressure requirement for any operating sprinkler is to ensure sufficient flow rate and area coverage to control a fire.
4.11.6 Solid waste and linen chutes shall have no inlet or discharge openings within an exitway.

4.12 Long corridor subdivision

4.12.1 Long corridors shall be subdivided by smoke separations and smoke control doors (see Figure 4.7) which shall be evenly spaced along the corridor and no further apart than:

a) 40 m within open paths, or
b) 80 m within safe paths.

These lengths may be increased by 50% if the building is sprinklered.

Comment:
The smoke control doors are to swing both ways if required by Paragraph 3.15.3.
Hold-open devices are required by Paragraph 3.15.9 to allow the doors to remain open during normal use of the building, but close automatically in the event of a fire.

4.13 Floors

4.13.1 Floors in buildings shall be fire separations (see Figure 4.6) except if any of the following conditions are satisfied:

a) The floor is an intermediate floor within a firecell (see Paragraphs 4.13.3 and 4.13.4 for FRR requirement), or
b) The floor is the lowest floor above an unoccupied subfloor space, and complies with Paragraph 4.14.1.

4.13.2 Floors only need to be rated from the underside (see Figure 4.6). The FRR of a floor shall be that rating applicable to the firecell directly below the floor.

Intermediate floors

4.13.3 Intermediate floors within household units and suites do not require a fire rating.

4.13.4 Intermediate floors other than those described in Paragraph 4.13.3 and stairs used as access and their supporting primary elements within the firecell shall have FRRs of at least 30 minutes.

4.13.5 A firecell containing support functions to the sleeping firecell with an intermediate floor satisfying the following conditions may be treated as a single floor firecell if:

a) There is only one intermediate floor, and
b) The total occupant load on the intermediate floor is not greater than 100, and
c) The total area of the intermediate floor is no greater than specified in Paragraph 4.13.6.

4.13.6 The maximum total area of the intermediate floor within the firecell shall be the lowest of:

a) 20% of the area of the firecell floor not including the area of the intermediate floor if the intermediate floor is enclosed or partitioned, or
b) 40% of the area of the firecell floor not including the area of the intermediate floor if the intermediate floor:
   i) is completely open, or
   ii) if enclosed or partitioned, a Type 4 system is installed, or
c) The area that allows up to 100 occupants on the intermediate floor based upon the occupant density of the space as calculated in accordance with Paragraph 1.4.

Comment:
The smaller (20%) floor area is a concession for spaces used essentially for storage with a low occupant density.

Firecells containing intermediate floors require the same fire safety precautions as single level firecells having the same total occupant load and escape height.

As 100 occupants is the maximum occupant load of an intermediate floor (depending on the activity on that floor), the area of that floor cannot exceed that necessary to accommodate 100 persons.

4.13.7 THIS PARAGRAPH DELIBERATELY LEFT BLANK
Door closers are recommended on these doors if the corridor is an open path. Smoke control doors are required if the corridor is a smoke lobby, or fire doors if it is a safe path.

Smoke separations and smoke control doors evenly spaced along corridor. Doors shall swing both ways and have hold open devices.

Distance ‘A’ shall not exceed: the distance specified in Paragraph 4.12.1

Flytowers, walkways and similar structures

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Basement floors

4.13.9 Basement firecells shall be separated from one another, and from the lowest firecell above ground level, by fire separations having FRRs in accordance with Paragraph 2.3.
4.14 Subfloor spaces

4.14.1 In buildings with an unoccupied subfloor space between the ground and lowest floor (see Figure 4.8), the floor shall have an FRR in accordance with Paragraph 2.3 except that no FRR is required if the following conditions are satisfied:

a) Vertical fire separations and external walls extend down to ground level and enclose the space, and

b) Access is available only for intermittent servicing of plumbing, drainage or other static services, and

c) The space is not used for storage and does not contain any installation such as machinery or heating appliances which could create a fire hazard, except when fire separated from the rest of the subfloor space.

Figure 4.8 Subfloor spaces

Paragraph 4.14.1
4.15 Concealed spaces

4.15.1 The spread of fire in concealed spaces and cavities shall be avoided by ensuring that extensive voids do not pass from one firecell to another, and by blocking off smaller voids with cavity barriers or, where appropriate, by using fire stops, see Paragraph 4.4.

Comment: Enclosing spaces with fire and smoke separations is one of the methods of controlling fire and smoke spread for satisfying this Acceptable Solution. However, if fire separations are internal walls, it is essential that those walls enclose any upper concealed space by extending beyond the ceiling to the floor or roof above.

Smoke detection and alarm systems are often relied on to provide building occupants, particularly sleeping risk groups, with early warning in the event of fire. However, where the smoke detectors are located only in the occupied spaces, smoke and fire can travel unobserved in upper concealed spaces that have not been fire or smoke separated. See Paragraph 4.15.2 for subdivision requirements for concealed spaces.

Concealed spaces within firecells

4.15.2 An upper concealed space may be used as an air handling plenum (see Figure 4.9) if the following requirements are satisfied:

a) The upper concealed space shall not extend into another firecell, and

b) The ceiling and its supports and surfaces within the concealed space shall be non-combustible, and

c) Electrical wiring is supported clear of the ceiling members and other equipment, and

d) Any material used such as pipe insulation or acoustic insulation complies with the requirements of Table 4.1, and

e) Where the air handling plenum is used as an air supply path, a Type 4 alarm system is installed with detectors in all return air ducts, and

f) Where the air handling plenum is used as an air supply path, detector activation causes the ventilation system to switch from circulation to extract as required by Paragraph 4.18.2.

Comment: Paragraph 4.15.2 e) and f) do not apply when the air handling plenum is used as an air exhaust path with a separate ducted air supply to the firecell.
Cavity barriers in walls and floors

4.15.3 Any concealed space which may be a path for fire spread within internal walls or floors which are fire separations, or within external walls, shall have cavity barriers or be fire stopped (see Paragraph 4.4) at all common junctions (see Figures 4.10 and 4.11).

Comment:
In multi-storey buildings it is essential to avoid rapid vertical fire spread between floors. Paragraph 5.7.14 deals with the particular requirement for external walls, where “curtain wall” type construction may create extensive cavities.
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.

Restriction of roof and ceiling space areas in unsprinklered firecells

4.15.6 Within unsprinklered firecells, roof space and ceiling space areas shall be subdivided by fire separations to prevent the hidden spread of fire. Any space between ceilings and roofs or floors above shall exceed neither 400 m² in area, measured at ceiling level, nor 30 m in length or width. This provision does not apply where the ceiling space is a separate firecell.

4.15.7 The fire separations used for subdivision shall have an FRR in accordance with Paragraph 2.3 and shall extend from the ceiling to the underside of the external roof cladding or floor above. Any gaps shall be fire stopped as specified in Paragraph 4.4.

4.15.8 If openings in the fire separations are required for service access or any other reason, they shall be fitted with fire resisting closures. Gaps around service penetrations shall be fire stopped.

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, goods or services), closures to those openings shall have the fire resistance and smoke control performance as follows:

a) An FRR of -/60/30 sm if unsprinklered, except as permitted by Paragraphs 4.16.11 and 4.16.12 and plant rooms require an FRR of -/90/30 sm, or

b) An FRR of -/30/- sm if sprinklered except plant rooms require an FRR of -/45/- sm.

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

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.

c) Fire doors with smoke control capability shall comply with both a) and b).

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, if either:
   i) the firecell is sprinklered and has an automatic smoke detection system, or
   ii) a smokecell is placed between the doors and the rest of the firecell, other than when the lift shaft is permitted to be in the vertical safe path.

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.

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) At smoke control separations in vertical safe paths

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).
NOTE: If the corridor is greater than 40 m in an open path or 80 m in a safe path smoke control doors are required.
Figure 4.14 Fire doors and smoke control doors
Paragraphs 4.16.8 and 4.16.9
Fire doors

4.16.9 Fire doors shall be provided:

a) Between an open path and a safe path (see Figures 3.15 and 4.15)

b) Between a smoke lobby and a safe path (see Figure 4.14)

c) Where the escape route passes through a fire separation (see Figure 4.15) or into an adjoining building (see Figure 3.10)

d) Where the escape route passes through a fire separation which isolates the safe path from levels below the final exit (see Figure 4.16), and

e) In fire separations between vertical and horizontal portions of internal safe paths.

Comment:
Doors at final exits are not required to be fire rated. Fire doors in exitways protect occupants from the effects of fire during evacuation. Fire doors at the head of stairs to basements isolate the basement section of the vertical safe path as required by Paragraph 4.9.3.
Acceptable Solution C/AS2

Figure 4.16 Fire doors to separate floors above and below final exit level
Paragraph 4.16.9 d)
**Protectected shaft access panels**

**4.16.10** Access panels to *protected shafts* shall have the *fire* resistance performance as required by Paragraph 4.16.1 and shall:

a) Be capable of being opened only with a special tool, and

b) If smoke seals cannot be provided, be tight-fitting with a maximum total gap of 8 mm around the panel (see Figure 4.17).

**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.

**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* through which the duct passes.

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.

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

**Comment:**

*Fire dampers* are not effective in stopping smoke and are not required in *smoke separations*. Smoke control in ducts is effected by smoke control devices in the air handling system (see Paragraph 4.18).
Fire shutters

4.16.13 If a floor has a service opening (eg, for stairs, 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.

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.

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.

Floors

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 4.1 Surface finishes

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
<th>Column 6</th>
<th>Column 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exitways All occupied spaces in importance level 4 buildings</td>
<td>Wall materials in sleeping spaces (not in household units)</td>
<td>Ceiling materials in sleeping spaces (not in household units)</td>
<td>All other occupied spaces including household units: walls and ceilings</td>
<td>Ducts for HVAC systems: internal surfaces</td>
<td>Ducts for HVAC systems: external surfaces</td>
<td>Acoustic treatment and pipe insulation within air handling plenum</td>
</tr>
</tbody>
</table>

Maximum permitted Group Number

<table>
<thead>
<tr>
<th>Unsprinklered</th>
<th>1S</th>
<th>2S</th>
<th>2S</th>
<th>3</th>
<th>1S</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinklered</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Comment:
The method for assigning the Group Number to a material and for establishing the smoke production rate 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.

### Table 4.2 Critical radiant flux requirements for flooring

<table>
<thead>
<tr>
<th>Area of building</th>
<th>Minimum critical radiant flux when tested to ISO 9239-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buildings not protected with a fire sprinkler system</td>
</tr>
<tr>
<td>Exitways in all buildings</td>
<td>2.2 kW/m²</td>
</tr>
<tr>
<td>Firecells accommodating more than 50 people</td>
<td>2.2 kW/m²</td>
</tr>
<tr>
<td>All other occupied spaces other than household units</td>
<td>1.2 kW/m²</td>
</tr>
</tbody>
</table>

### Exceptions to surface finish requirements

**4.17.6 Surface finish requirements do not apply to:**

- a) Small areas of non-conforming product within a firecell with a total aggregate surface area of not more than 5.0 m²
- b) Electrical switches, outlets, cover plates and similar small discontinuous areas
- c) Pipes and cables used to distribute power or services
- d) Handrails and general decorative trim of any material such as architraves, skirtings and window components, including reveals, provided these do not exceed 5% of the surface area of the wall or ceiling they are part of
- e) Damp-proof courses, seals, caulking, flashings, thermal breaks and ground moisture barriers
- 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
- 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, and
- i) Marae buildings using traditional Māori construction materials (eg, tukutuku and toetoe panels).

Comment:
Note that if this exception is applied, exit widths and travel distances for marae buildings as in i) must comply with the requirements of Paragraphs 3.3.2 j) and 3.4.2 e) respectively.

### 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:
1. Nominal 20 mm thickness includes standard flooring products such as 19 mm particle board or 17 mm plywood. These are acceptable.
2. 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.

### Trampers’ huts

**4.17.7** In trampers’ huts used for overnight accommodation in remote locations, wall and ceiling linings with a maximum Group Number of 3 are acceptable provided that:

- a) The occupant load is no greater than 20, and
- b) All sleeping spaces have no fewer than two escape routes.
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 no greater than 12, and

b) When used as underlay to roofing or exterior cladding that is exposed to view, have a flammability index of no greater than 5.

Membrane structures

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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.

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

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, 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 If 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 the 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:
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 a FRR determined using the property rating.

5.3.2 Any part of an external wall enclosing a firecell and not permitted to be an unprotected area shall have an FRR 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.

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.

Size and spacing of Type A and Type B areas

5.4.2 Type A areas shall be no greater than 0.1 m². Type B areas shall be no greater than permitted by Table 5.1 according to the distance from the relevant boundary.

5.4.3 The fire resisting glazing shall be rated for integrity and the FRR of both the glazing and the external wall shall be in accordance with Paragraph 2.3.

5.4.4 There is no limitation on the spacing between adjacent Type A and Type B areas which occur in different firecells. Within a firecell the following requirements shall apply:

a) Type A areas shall be no closer, both vertically and horizontally, than 1.5 m to another Type A or to a Type B area

b) Type B areas shall be no closer to one another, vertically or horizontally, than the dimensions X or Y shown on Figure 5.1, and

c) Where Type B areas are staggered, rather than being aligned vertically or horizontally, the shortest distance, in any direction, between adjacent areas shall be no less than the greater of the X and Y measurements.

5.5 Table method for external walls

5.5.1 The table method for external walls is a means of satisfying the requirements of this Acceptable Solution for the control of external fire spread and shall be applied to external walls of buildings which are parallel to or angled at less than 90° to the relevant boundary. Table 5.2 is split into three parts according to the angle incident between the subject wall and the relevant boundary. If the wall is parallel to the boundary or the angle is less than 45°, then columns 2 and 3 shall be used (see Figures 5.2 and 5.3).
Figure 5.1 Method 1 – Permitted small unprotected areas and fire resisting glazing
Paragraphs 5.4.1 and 5.4.4

Dimensions shown are minimum distances between Type A unprotected areas and
of Type B fire resisting glazing

Legend

A □ Type A unprotected areas of 0.1 m² maximum
B □ Type B areas of fire resisting glazing complying with Table 5.1
NL No limitation on spacing
X Spacing to be no less than the greater of the widths of the two Type B areas being
considered
Y Spacing to be no less than the greater of the heights of the two Type B areas being
considered
Paragraph 5.5.1

(a) ADJOINING FIRECELLS

(b) SEPARATE BUILDINGS
5.5.2 The table method shall be used to determine the percentage of unprotected area in the external wall of each firecell depending on the distance to the relevant boundary.

5.5.3 Table 5.2 can also be used to determine the required distance from the relevant boundary where the percentage of unprotected area has previously been determined. Select the appropriate percentage (under the rectangle width column) and read the permitted distance to the relevant boundary from the left hand column of Table 5.2.

5.5.4 If Table 5.2 does not contain the exact measurements for the firecell being considered, use the next highest value for percentage area or next lowest value for boundary distance.

5.5.5 The largest individual unprotected area in the external wall and distance to any adjacent unprotected areas shall be restricted to the maximum dimensions specified in Table 5.3.

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5.5.7 As an alternative to the table method the Commentary to Verification Method Appendix A: Methodology for Horizontal Fire Spread (Tabular Data) can be used. For this method the tables for unprotected area and the wing/return wall tables in the Commentary must be used together.

Comment:
For guidance on the appropriate FLED refer to Table 2.2 of Verification Method C/VM2. This method requires a higher level of understanding of spread of fire to other property and should only be used by suitably qualified and experienced designers.
Table 5.2 Maximum percentage of unprotected area for external walls

<table>
<thead>
<tr>
<th>Risk group</th>
<th>SM</th>
<th>Percentage of wall area allowed to be unprotected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Column 2</td>
<td>Column 3</td>
</tr>
<tr>
<td>Less than 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>55</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5.3 Maximum size of largest permitted single unprotected area in external walls

<table>
<thead>
<tr>
<th>Minimum distance to relevant boundary (m) (see Figure 5.3)</th>
<th>Unsprinklered firecell</th>
<th>Sprinklered firecell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angle between wall and relevant boundary up to 45°</td>
<td>Up to 5 m</td>
<td>Greater than 5 m</td>
</tr>
<tr>
<td>Width of unsprinklered firecell</td>
<td>Width of sprinklered firecell</td>
<td>Width of unsprinklered firecell</td>
</tr>
<tr>
<td>Width of unsprinklered firecell</td>
<td>Width of sprinklered firecell</td>
<td>Width of unsprinklered firecell</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>4.5</td>
</tr>
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<td>4</td>
<td>20</td>
<td>5.5</td>
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<tr>
<td>5</td>
<td>29</td>
<td>6.5</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>7.5</td>
</tr>
</tbody>
</table>

5.6 Horizontal fire spread from roofs and open sided buildings

5.6.1 THIS PARAGRAPh DELIBERATELY LEFT BLANK

Parapets for storage

5.6.2 For unsprinklered firecells, if combustible materials are stored on an area of roof within 1.5 m of a relevant boundary, but the conditions of Paragraph 5.7.16 (for an adjacent higher wall) do not apply, a parapet shall be constructed. The parapet shall extend no less than 1.5 m, or above the top of the stored materials, on the side of the relevant boundary. The parapet shall have an FRR in accordance with Paragraph 2.3.
Roof projections

5.6.3 If the external wall is required to have an FRR, the eaves projection shall be constructed with the same FRR as the external wall. Alternatively, the external wall shall be extended to the underside of the roof and the eaves need not be fire rated (see Figure 5.4).

5.6.4 If the external wall is not required to have an FRR, roof eaves projecting from that wall need not be rated provided that no part of the eaves construction is closer than 650 mm to the relevant boundary.

5.6.5 If the external wall, on its own, is not required to have an FRR, but roof eaves extend to within 650 mm of the relevant boundary, the total eaves construction and the external wall from which they project shall have FRRs in accordance with Paragraph 2.3 (see Figure 5.4).

Open sided buildings

5.6.6 An open sided building may be either a detached building or connected to another building (see Figure 5.5). For the open sided building to be deemed ‘detached’, the horizontal distance between the other

Comment:
For vehicle parking on roofs, see Acceptable Solution C/AS7.

Comment:
Eaves construction includes the guttering or spouting and any other projections from the eaves, although guttering or spouting need not be fire rated.

Figure 5.4 Eaves projection
Paragraphs 5.6.3 and 5.6.5

NOTE: Either ‘a’ or ‘b’ to be fire rated.

Underside of roof covering

‘a’

‘b’

Less than 650 mm

Greater than 1 m
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.
building and the roof of the open sided building shall be no less than:

a) 1.0 m for a roof area exceeding 40 m², and
b) 0.3 m for a roof area no greater than 40 m².

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 porte cocheres, while those with roof areas of less than 40 m² would be structures such as carports.

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.

5.7 Vertical fire spread

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

5.7.2 Protection against fire spread shall be achieved using one or more of the following methods:

a) Separation by distance
b) Fire rating the adjoining external wall
c) Fire rating all or part of the roof against the threat of fire from the underside
d) Installing sprinklers in the firecell below the roof.

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
5.7.6 Fire spread from a roof close to and lower than an external wall shall be avoided by compliance with Paragraph 5.7.7 where firecells behind the wall contain:

i) Other property, or
ii) Sleeping risk groups SI or SM in the same building (as the lower roof), or in an adjacent building on the same title, or
iii) Exitways in the same building (as the lower roof), or in an adjacent building on the same title.

5.7.7 Where the distance between any part of an external wall and a lower roof is less than 9.0 m vertically or 5.0 m horizontally
(see Figure 5.6), protective measures shall be applied either to the roof as specified in Paragraph 5.7.8 or to the wall as specified in Paragraph 5.7.9.

**5.7.8** Roof protection shall be achieved by:

a) Providing sprinklers throughout the building, or

b) Constructing that part of the roof within 5.0 m horizontally of the wall, with an FRR in accordance with Paragraph 2.3.

**5.7.9** External wall protection above an adjacent lower roof shall be provided by constructing the critical part of the wall (closer to the roof than 9.0 m vertically or 5.0 m horizontally (see Figure 5.6)) with an FRR in accordance with Paragraph 2.3.

**External fire spread between different levels of the same building**

**5.7.10** Except where firecells are sprinklered, unprotected areas in external walls shall be protected against vertical fire spread if any of the following conditions occur:

a) Firecells containing sleeping risk groups or exitways have an escape height of 4.0 m or more, or
b) DELIBERATELY LEFT BLANK

c) Firecells containing other property are located one above the other.

**5.7.11** If the conditions of Paragraph 5.7.10 occur, unprotected areas (see Figure 5.7) in the external walls of the firecells shall be separated by no less than:

a) 1500 mm where any parts of the unprotected areas are vertically aligned above one another, or

b) 900 mm where the unprotected areas on

---

**Figure 5.7** Separation of unprotected areas
Paragraph 5.7.11
one level are horizontally offset from those on the other level (see Comment below Paragraph 5.7.13).

**Spandrels and apron projections**

5.7.12 Spandrels may be omitted where an apron projecting no less than 0.6 m is constructed. Table 5.4 specifies the acceptable combinations of apron projection and spandrel height.

<table>
<thead>
<tr>
<th>Apron projection (m)</th>
<th>Spandrel height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1.5</td>
</tr>
<tr>
<td>0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>0.45</td>
<td>0.5</td>
</tr>
<tr>
<td>0.6</td>
<td>0.0</td>
</tr>
</tbody>
</table>

5.7.13 Aprons shall extend horizontally beyond the outer corners of the unprotected area by no less than the apron projection distance. Aprons and spandrels shall have FRRs of no less than that of the floor separating the upper and lower firecells. Spandrels shall be rated from both sides. Aprons need only be rated from the underside.

**Comment:**
The arrangement of windows in each external wall is crucial to the prevention of spread of fire from floor to floor vertically due to flame projection. The requirements of Paragraph 5.7.11 allow a chess board arrangement, vertical spacing of 1.5 m, or aprons. See also Paragraph 5.3 for application of FRRs to external walls.

5.7.14 Where there is a gap between an external wall and a fire separation which together enclose a firecell, the space between the fire separation and the external wall shall be no greater than 50 mm and shall be fire stopped (see Paragraphs 4.15.3 to 4.15.5 and Figure 4.10).

5.7.15 Eaves and floors overhanging an external wall shall be protected as required by Paragraphs 5.6.3 to 5.6.5.

**Roof storage**

5.7.16 Storage of combustible materials on a roof is not permitted within 1.5 m of a higher external wall if the adjacent building above contains sleeping risk groups.

**External thermal insulation on walls in multi-storey buildings**

5.7.17 Buildings of three or more floors with an external wall cladding system incorporating an externally applied combustible insulant shall have horizontal fire stop barriers installed in the cladding system at intervals of not more than two floors. For framed wall systems a barrier shall be constructed within the framed cavity, and a fire stop barrier shall be constructed at the same level within the cladding system. An acceptable detail for barriers is shown in Figure 5.8. This requirement does not apply to combustible...
Figure 5.8 Barriers to vertical fire spread in foamed plastics external insulation systems

Paragraph 5.7.17

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insulant positioned between studs and dwangs/nogs in a conventional framed wall system.

5.7.18 Paragraph 5.7.17 applies where the floors are fire separations between firecells. It does not apply to any external wall satisfying the test requirements of Paragraph 5.8.2 b).

Comment: Horizontal fire stop barriers are needed to prevent progressive involvement of insulants in fire by restricting hot gases or flames from travelling upwards within the insulation layer. In practice, it may be necessary to specify movement joints to control cracking of the render or surface coating. These may be conveniently incorporated within barriers. Further guidance and suitable fire barrier details may be found in BRE Defect Action Sheet DAS 131 with additional information provided in BRE Report 135.

5.8 Exterior surface finishes

5.8.1 The external wall cladding system shall be tested in accordance with the relevant standard test in Appendix C C7.1 and shall satisfy the following requirements:

a) If the distance to the relevant boundary is less than 1.0 m, the peak heat release rate shall not exceed 100 kW/m² and the total heat released shall not exceed 25 MJ/m², and

b) If the distance to the relevant boundary is 1.0 m or more and the building height is greater than 7.0 m the peak heat release rate shall not exceed 150 kW/m² and the total heat released shall not exceed 50 MJ/m².

5.8.2 The requirements in Paragraph 5.8.1 do not apply if:

a) Surface finishes are no more than 1 mm in thickness and applied directly to a non-combustible substrate, or

b) The entire wall assembly has been tested at full scale in accordance with NFPA 285 and has passed the test criteria.

5.8.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

5.8.4 If a building has firecells containing different risk groups, the acceptable peak heat release rate and total heat released of an external wall cladding system may have different values provided that:

a) For each risk group the value is no greater than required by Paragraph 5.8.1 for the building height (not just the height of the firecell), and

b) The value applied to a firecell is no greater than required by any firecells at a higher level on that wall.

Comment: For external walls, the acceptable properties of external wall cladding systems depend on the building height, presence of sprinklers and the distance from the relevant boundary.

An external wall cladding system includes any applied surface finish such as paint or other coating combined with the substrate material. Fire tests should be carried out on samples representative of the finished product as used on the building to determine compliance.

While the specific heat release rate of a cladding system must be verified by standard test results, the following is an indication of the performance of some types of construction:

- Non-combustible materials such as concrete, brick, glass and steel meet the requirements of Paragraph 5.8.1
- Cellulose fibre-cement products with applied finishes/coatings less than 1 mm thick would usually meet the requirements of Paragraph 5.8.1, and
- Ordinary timber products would usually not meet the requirements of Paragraph 5.8.1.

Where the combustibility of a timber product is modified through the application of a fire retardant treatment to meet the requirements of Paragraph 5.8.1, it is to be subjected to pre-test accelerated weathering as described in Appendix C C7.1.3.
Part 6: Firefighting

6.1 Fire Service vehicular access

6.1.1 If buildings are located remotely from the street boundaries of a property, pavements situated on the property and likely to be used for vehicular access by fire appliances shall:

a) Be able to withstand a laden weight of up to 25 tonnes with an axle load of 8 tonnes or have a load-bearing capacity of no less than the public roadway serving the property, whichever is the lower, and

b) Be trafficable in all weathers, and

c) Have a minimum width of 4.0 m, and

d) Provide a clear passageway of no less than 3.5 m in width and 4.0 m in height at site entrances, internal entrances and between buildings, and

e) Provide access to a hard-standing within 20 m of:

i) an entrance to the building, and

ii) any inlets to fire sprinkler or building fire hydrant systems.

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

6.1.2 THIS PARAGRAPH DELIBERATELY LEFT BLANK

6.2 Information for firefighters

6.2.1 If fire detection and alarm systems or sprinkler systems are installed, the control panel shall be located in a position close to the Fire Service attendance point and in accordance with NZS 4512, NZS 4515 and NZS 4541 as appropriate.

6.2.2 If hazardous substances are present in the building, warning signage in accordance with NZBC F8 shall be displayed.
6.3 Access within the building for firefighting and rescue operations

6.3.1 THIS PARAGRAPH DELIBERATELY LEFT BLANK

Comment:
The requirements for means of escape from fire and provision of fire safety systems given in Parts 2 and 3 of this Acceptable Solution provide access for firefighting and rescue operations as well as safe egress for building occupants.

6.4 Firefighting facilities

Fire hydrant system

6.4.1 Building fire hydrant systems shall be installed as specified in Paragraph 2.2 and shall meet the requirements of Appendix A A2.1.1.

6.4.2 The control features of fire safety systems shall be located at a position with ready access from street level and protected from the effects of fire including debris falling from upper floors.

Fire Service lift control

6.4.3 Fire Service lift control is required if the escape height exceeds 10 m. The control of lifts under fire conditions shall comply with NZS 4332.
Part 7: Prevention of fire occurring

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

7.1 Solid fuel appliances

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

a) Domestic solid fuel burning appliances installed in either domestic or commercial situations, and

b) Flue systems.

A normative Appendix is an integral part of this Standard.

7.1.2 Modifications to AS/NZS 2918

Delete paragraph 3.8 and substitute the following:

“3.8 Seismic restraint

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

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

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

Delete Section 7 and substitute the following:

“7.1 Ventilation

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

7.2 Water heating equipment

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

7.2.1 For gas-burning appliances AS/NZS 5601.1 sections 6.7, 6.8 and 6.9 and Appendix H are Acceptable Solutions for the construction and installation of flues and sections 5.11, 6.2, 6.3 and 6.10 are Acceptable Solutions for the installation of appliances, with the modifications given in Paragraph 7.2.2.

7.2.2 Modifications to AS/NZS 5601.1

Delete paragraph 6.2.11 and substitute the following:

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

Add a Note to 6.4 as follows:

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

7.3 Oil-fired appliances

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

7.3.2 Modifications to AS 1691

Delete paragraph 2.2.3 and substitute the following:

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

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

Delete the Note to paragraph 3.1.2 (d).

Delete paragraph 3.1.4 and substitute the following:

“3.1.4 Stability
The appliance shall be mechanically fixed to the building.

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

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

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

Delete paragraph 5.1.1.

Add Note to 5.2.2:

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

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

7.4 Downlights

7.4.1 In residential occupancies, recessed luminaires shall be one of the following types, as specified in AS/NZS 60598.2.2:

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

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

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

7.4.2 In occupancies other than residential, recessed luminaires shall be installed with clearances from building elements including insulation of 100 mm.

Comment:
The requirement for a clearance of 100 mm from recessed luminaires also applies when installing or replacing insulation and the type of recessed luminaire is unknown.
7.5 Open fires

Chimneys

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

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

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

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

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

<table>
<thead>
<tr>
<th>Chimney construction</th>
<th>Chimney jamb and chimney back thickness</th>
<th>Chimney breasts and side gathering, and chimney wall thickness above the level of the gather, excluding linings (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excluding filling and flue liner (mm)</td>
<td>Including filling and flue liner (mm)</td>
</tr>
<tr>
<td>Concrete</td>
<td>170</td>
<td>255</td>
</tr>
<tr>
<td>Brickwork</td>
<td>155</td>
<td>230</td>
</tr>
<tr>
<td>Precast pumice concrete</td>
<td>85</td>
<td>170</td>
</tr>
</tbody>
</table>
Figure 7.1 Chimney terms and dimensions

Paragraph 7.5

Acceptable Solution C/AS2

- Back dimension including filling and fire lining
- Jamb dimension including filling and fire lining
- Hearth
- 380 mm minimum

- Back dimension excluding filling and fire lining
- Chimney breast above
- 50 mm clearance for combustible material
- Jamb dimension excluding filling and fire lining
- Firebrick or equivalent fire liner (50 mm minimum thickness)

Section A - A

- Chimney flue
- Chimney breast
- Chimney side gathering
- Chimney jamb
- Fireplace
- Hearth

Section B - B
7.5.2 Cross-sectional areas of flues shall be no less than 0.03 m² for an open fireplace (see Figure 7.2).

7.5.3 Flue linings shall be one of the following types:

a) Clay flue liners with rebated or socketed joints, or

b) Imperforate clay pipes with socketed joints, or

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

The linings shall be fitted with the sockets or rebates uppermost to prevent condensate running out, and to prevent any caulking material from being adversely affected. Joints between the liners, and any space between liners and the masonry, shall be filled with weak mortar or insulating concrete (see Figure 7.2 (a)).
7.5.4 Flue liners are not required for:
   a) Brick chimneys if constructed of two 90 mm skins of brickwork with a 65 mm grout-filled gap between (see Figure 7.2 (b)), or
   b) Ordinary concrete chimneys, or
   c) Precast pumice concrete chimneys.

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

7.5.6 Every fireplace shall have a separate flue.

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

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

7.5.9 Clearances between a chimney and any combustible material (see Figure 7.3) shall be no less than:
   a) 200 mm at any opening in the flue, or at the fireplace opening, and
   b) 200 mm above or below the upper surface of the hearth, and 75 mm from the lower surface of the hearth.

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

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

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

7.5.12 AS/NZS 2918 Sections 2 and 4 are also Acceptable Solutions for the installation of flues from open fires.
Figure 7.3 Clearances between a chimney and hearth, and combustible materials

Paragraph 7.5.9

Acceptable Solution C/AS2

Chimney flue liner built of non-combustable material

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

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

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

Hearth clearance, see section below

Section showing minimum dimensions

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

50 mm minimum

200 mm minimum

Ventilated space

Combustible material
Appendix A (normative): Fire safety systems

A1.1 Fire alarm and sprinkler systems

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

A1.2 Requirements common to alarm systems

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

A2.1 Fire safety system descriptions

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

Type 9 – Smoke control in air-handling systems

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

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

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

Type 18 – Fire hydrant systems for buildings

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

B1.1 Introduction

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

B2.1 Automatic fire sprinkler systems

NZS 4541 is amended as follows:

Clause 103 Definitions

Sprinkler system A system including:

(a) to (i) No change.

(j) Delete.

(k) Delete.

(l) No change.

Clause 205 Delete entire clause.

Clause 209 Delete entire clause.

Clause 1203 Routine Surveys

Clause 1203.1 Delete first two paragraphs and replace with:

“"It is important that a sprinkler system at all times complies with this Standard as amended by Paragraph B2.1 of Appendix B to C/AS2 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person.""
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 date of testing.

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

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

C4.1 Properties of lining materials

C4.1.1 Combustibility test
Materials shall be classified as non-combustible or combustible when tested to:

C4.1.2 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 in C/VM2.

Australian and European classifications can be used to achieve Group Numbers in Table C1.

Table C1

<table>
<thead>
<tr>
<th>Requirements according to C/VM2 Appendix A using ISO 9705 or ISO 5660</th>
<th>Requirements according to NCC Specification C1.10 Clause 4 using AS ISO 9705</th>
<th>European Classification using EN 13501-1</th>
</tr>
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<tbody>
<tr>
<td>Group Number 1- S</td>
<td>Group Number 1, and a smoke growth rate index not more than 100</td>
<td>Class A1, A2 or B Class B and Smoke production rating s1 or s2</td>
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<tr>
<td>Group Number 1</td>
<td>Group Number 1</td>
<td>Class A1, A2 or B</td>
</tr>
<tr>
<td>Group Number 2- S</td>
<td>Group Number 2, and a smoke growth rate index not more than 100</td>
<td>Class C and Smoke production rating s1 or s2</td>
</tr>
<tr>
<td>Group Number 2</td>
<td>Group Number 2</td>
<td>Class C</td>
</tr>
<tr>
<td>Group Number 3</td>
<td>Group Number 3</td>
<td>Class D</td>
</tr>
<tr>
<td>Group Number 4</td>
<td>Group Number 4</td>
<td>Class E and F</td>
</tr>
</tbody>
</table>
C5.1 Fire resistance

C5.1.1 Primary and secondary elements, closures and fire stops shall be assigned a fire resistance rating (FRR) when tested to:

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

C5.1.2 Fire stops shall be tested:

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

C6.1 Fire doors and smoke control doors

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

Smoke control doors

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

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 by 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.
References are to the relevant paragraphs, figures or tables in C/AS2 unless otherwise stated. References to Appendices are prefixed by the Appendix letter.

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