C/AS4

Acceptable Solution for Buildings with Public Access and Educational Facilities (Risk Group CA)

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.
Status of C/AS4

This Acceptable Solution C/AS4, for buildings with public access and educational facilities (Risk Group CA), 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/AS4

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

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

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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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Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Chimney back** The non-combustible wall forming the back of a fireplace.
**Chimney breast** The front *fireplace* wall construction above the *fireplace* opening.

**Chimney jambs** The side walls of a *fireplace*.

**Combustible** See *non-combustible*.

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

**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.

**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*.

**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*.

**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.

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

**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.

**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 (e.g., 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.

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

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

Hazardous substance has the meaning ascribed to it by section 2 of the Fire Service Act 1975 and section 2 of the Hazardous Substances and New Organisms Act 1996.

Hearth The insulating floor under the fire and in front and at the sides of the fireplace.

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

Household unit (a) means a building or group of buildings, or part of a building or group of buildings, that is—
(i) used, or intended to be used, only or mainly for residential purposes; and
(ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than 1 household; but
(b) does not include a hostel, boarding house, or other specialised accommodation.

HVAC An abbreviation for heating, ventilating and airconditioning.

Insulating material A material that has a thermal conductivity of less than 0.07 W/mK.

Insulation In the context of fire protection, the time in minutes for which a prototype specimen of a fire separation, when subjected to the standard test for fire resistance, has limited the transmission of heat through the specimen.
Integrity In the context of fire protection, the time in minutes for which a prototype specimen of a fire separation, when subjected to the standard test for fire resistance, has prevented the passage of flame or hot gases.

Comment: The precise meaning of integrity depends on the type of building elements being treated and how it is defined in the standard test being used.

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

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

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

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

Means of escape from fire In relation to a building that has a floor area,—
a) means continuous unobstructed routes of travel from any part of the floor area of that building to a place of safety; and
b) includes all active and passive protection features required to warn people of fire and to assist in protecting people from the effects of fire in the course of their escape from the fire.

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

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

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

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

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

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 cross-leases, company leases, or unit titles, or between one of them and common property, is not generally called a party wall but in that case also the lessees, unit title holders, or corporate body concerned each have legal rights in respect of that wall. Such a wall separates areas which are other property in relation to each other, but the wall itself is part of each property. The fire protection consequence of that legal concept is that such a wall can be regarded as a fire separation providing protection against horizontal fire spread in each direction. In other words, that wall may provide the appropriate FRR instead of each property having its own wall of that FRR.

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

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

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

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.

Smoke cell 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 an 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

d) Be of non-combustible construction, or achieve a FRR of 10/10/-, except that non-fire resisting glazing may be used if it is toughened or laminated safety glass.

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.

**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.

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**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.

**Wharenui** A communal meeting house having a large open floor area used for both assembly and sleeping in the traditional Maori manner.
Part 1: General

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/AS1 Buildings with sleeping (residential) and outbuildings</td>
<td>SH</td>
<td>Houses, townhouses and small multi-unit dwellings Outbuildings</td>
</tr>
<tr>
<td>C/AS2 Sleeping (non institutional)</td>
<td>SM</td>
<td>Permanent accommodation eg, apartments Transient accommodation eg, hotels, motels, hostels, backpackers, refuge shelters Education accommodation</td>
</tr>
<tr>
<td>C/AS3 Care or detention</td>
<td>SI</td>
<td>Institutions, hospitals (excluding special care facilities), residential care, rest homes, care in the community houses and homes, medical day treatment (using sedation), detention facilities (excluding prisons)</td>
</tr>
<tr>
<td>C/AS4 Public access and educational facilities</td>
<td>CA</td>
<td>Crowds, halls, recreation centres, public libraries (&lt;2.4 m storage height), cinemas, shops, personal services (eg, dentists and doctors except as included above, beautician and hairdressing salons), schools, restaurants and cafes, early childhood centres</td>
</tr>
<tr>
<td>C/AS5 Business, commercial and low level storage</td>
<td>WB</td>
<td>Offices (including professional services such as law and accountancy practices), laboratories, workshops, manufacturing (excluding foamed plastics), factories, processing, temperature controlled storage (capable of &lt;3.0 m storage height other than some limited areas in processing areas) and other storage buildings capable of &lt;5.0 m storage height (except some limited areas &lt;8.0 m to the apex), light aircraft hangars</td>
</tr>
<tr>
<td>C/AS6 High level storage and other high risks</td>
<td>WS</td>
<td>Warehouses (capable of ≥5.0 m storage height other than some limited areas, see C/AS5), temperature controlled storage (capable of ≥3.0 m storage height other than some limited areas, see C/AS5), trading and bulk retail (≥3.0 m storage height)</td>
</tr>
<tr>
<td>C/AS7 Vehicle storage and parking</td>
<td>VP</td>
<td>Vehicle parking – within a building or a separate building</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 CA. This covers buildings, or parts of buildings, where people congregate, participate in group activities, or where personal services are provided. These include the following, provided they are no more than 20 storeys high (from ground level):

- a) Halls, theatres, cinemas
- b) Early childhood centres
- c) Shops and shopping malls
- d) Recreation and event centres (with tiered seating for up to 2000 people and with any primary egress for more than 100 people at the level of the playing surface)
- e) Churches and other places of worship
- f) Libraries with less than 2.4 m storage height
- g) Education institutions without sleeping, and
- h) Personal services eg, dentists and doctors (where not included in risk group SI), beauty therapists and hair salons.
Outside the scope of this Acceptable Solution

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

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

a) Atriums

b) Intermediate floors, other than limited area intermediate floors

c) Stadiums where tiered seating is provided for more than 2000 people or where the primary access for more than 100 people is above the level of the playing surface, and

d) Buildings more than 20 storeys high.

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

1.1.3 Other than where specifically required for early childhood centres, 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 CA by following steps 2 and 3.

d) Then apply the relevant Acceptable Solutions for firecells in 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 CA**

a) Establish the relevant building measurements (these will include building height, floor plans, wall openings and distances to relevant boundaries).

b) Work out the occupant loads for the relevant building spaces (refer to Paragraph 1.4).

**Comment:**
Applying the Acceptable Solution depends largely on the basic building measurements as above. Therefore, this should be determined as accurately as possible before using this document.

**Step 3: Satisfy the fire safety requirements**

Satisfy the fire safety requirements of this Acceptable Solution (refer to Parts 2-7), based on the occupant loads and on the building’s dimensions and features where required.

**Primary risk groups**

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

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

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

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

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

- Offices: WB
- Shops: CA
- Cafeteria: CA

**1.3 Alterations and changes of use to buildings**

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

**Comment:**
Sections 112 and 115 of the Building Act require the means of escape from fire of an existing building being altered, or the use being changed, to comply as nearly as is reasonably practicable with the Building Code. Parts 1, 2, 3, and 4 of this Acceptable Solution may be used for an assessment of the means of escape from fire of an existing building that is being altered, to meet the requirements of section 112 of the Building Act.

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

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

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

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

Sections 112 and 115 of the Building Act require the existing building to comply with other parts of the Building Code to at least the same extent as before the alteration or addition.
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 Occupant loads shall be calculated from the occupant densities given in Table 1.2 based on the floor area of the part of the building housing the activity (see Figure 1.1). The occupant densities in Table 1.2 already allow for a proportion of the floor area appropriate to the activity being occupied by furniture, partitions, fixtures (see Figure 1.1) and associated equipment. If a building space has alternative activity uses, the activity having the greatest occupant density shall be used. If an activity is not specifically described in Table 1.2, the nearest reasonable description shall be used.

**Comment:**

When using Table 1.2 to calculate the occupant load note that the occupant densities in Table 1.2 already allow for a proportion of the floor area appropriate to the activity being occupied by furniture, partitions, and fixtures and associated equipment.

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.

**Fixed seating**

1.4.4 Occupant load assessment shall take account of the actual arrangement and number of seats for fixed seating (see Paragraph 3.7.4). Where additional floor area abuts the fixed seating, additional occupants are permitted for based on standing space density, provided the escape route is not obstructed.

1.4.5 THIS PARAGRAPH DELIBERATELY LEFT BLANK

**Justification for exceptions**

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

**Comment:**

This may make it possible to reduce the occupant load to below a trigger point for a fire safety system (eg, if the occupant load is less than 1000, no sprinkler is required). However, note that designing a building for a reduced occupant load can severely restrict future occupancy options and may involve significant expense in meeting the means of escape from fire provisions for increased numbers.

1.4.7 If the maximum occupant load is greater than that calculated from Table 1.2, the higher number shall be used as the basis for the fire safety design and will need to be justified to the building consent authority.
Figure 1.1 Calculation of floor area of firecell

Paragraph 1.4.2

NOTE:
1. Occupant densities will be different for 'office' and 'conference room'.
2. Server room and kitchen will be intermittently occupied by the occupants of the office and this can be ignored for the purposes of calculating occupancy. However, the maximum occupancy of the kitchen is required to ensure there is sufficient exit width and number of exits from the space.

Area of Fire Cell = (L x B) - (X x Y) + (M x N)

NOTE:
1. Occupant densities will be different for 'office' and 'conference room'.
2. Server room and kitchen will be intermittently occupied by the occupants of the office and this can be ignored for the purposes of calculating occupancy. However, the maximum occupancy of the kitchen is required to ensure there is sufficient exit width and number of exits from the space.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Occupant density (m²/person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airports – baggage areas</td>
<td>2</td>
</tr>
<tr>
<td>– waiting areas, check in</td>
<td>1.4</td>
</tr>
<tr>
<td>– terminal space</td>
<td>10</td>
</tr>
<tr>
<td>Area without seating or aisles</td>
<td>1</td>
</tr>
<tr>
<td>Art galleries, museums</td>
<td>4</td>
</tr>
<tr>
<td>Bar sitting areas</td>
<td>1</td>
</tr>
<tr>
<td>Bar standing areas</td>
<td>0.5</td>
</tr>
<tr>
<td>Bleachers, pews or bench-type seating</td>
<td>0.45 linear m per person</td>
</tr>
<tr>
<td>Bulk retail (trading stores, supermarkets etc)</td>
<td>5</td>
</tr>
<tr>
<td>Classrooms</td>
<td>2</td>
</tr>
<tr>
<td>Consulting rooms (doctors, dentists, beauty therapy)</td>
<td>5</td>
</tr>
<tr>
<td>Dance floors</td>
<td>0.6</td>
</tr>
<tr>
<td>Day care centres</td>
<td>4</td>
</tr>
<tr>
<td>Dining, restaurant and cafeteria spaces</td>
<td>1.25</td>
</tr>
<tr>
<td>Early childhood centres</td>
<td>Based on Education (Early Childhood Services) Regulations 2008 plus the number of staff</td>
</tr>
<tr>
<td>Exhibition areas, trade fairs</td>
<td>1.4</td>
</tr>
<tr>
<td>Fitness centres/weights rooms</td>
<td>5</td>
</tr>
<tr>
<td>Gaming, casino areas</td>
<td>1</td>
</tr>
<tr>
<td>Indoor games areas, bowling alleys</td>
<td>10</td>
</tr>
<tr>
<td>Libraries: stack areas</td>
<td>10</td>
</tr>
<tr>
<td>Libraries: other areas</td>
<td>7</td>
</tr>
<tr>
<td>Lobbies and foyers</td>
<td>1</td>
</tr>
<tr>
<td>Mall areas used for assembly uses</td>
<td>1</td>
</tr>
<tr>
<td>Office spaces</td>
<td>10</td>
</tr>
<tr>
<td>Reading or writing rooms and lounges</td>
<td>2</td>
</tr>
<tr>
<td>Reception areas</td>
<td>10</td>
</tr>
<tr>
<td>Retail spaces and pedestrian circulation areas including malls and arcades</td>
<td>3.5</td>
</tr>
<tr>
<td>Retail spaces for furniture, floor coverings, large appliances, building supplies and Manchester</td>
<td>10</td>
</tr>
<tr>
<td>Showrooms</td>
<td>5</td>
</tr>
<tr>
<td>Space with fixed seating</td>
<td>As number of seats</td>
</tr>
<tr>
<td>Space with loose seating</td>
<td>0.8</td>
</tr>
<tr>
<td>Space with loose seating and tables</td>
<td>1.1</td>
</tr>
<tr>
<td>Sports halls</td>
<td>3</td>
</tr>
<tr>
<td>Stadiums and grandstands</td>
<td>0.6</td>
</tr>
<tr>
<td>Staffrooms and lunchrooms</td>
<td>5</td>
</tr>
<tr>
<td>Stages for theatrical performances</td>
<td>0.8</td>
</tr>
<tr>
<td>Standing space</td>
<td>0.4</td>
</tr>
<tr>
<td>Swimming pools (water surface area)</td>
<td>5</td>
</tr>
<tr>
<td>Swimming pools: surrounds and seating</td>
<td>3</td>
</tr>
<tr>
<td>Teaching laboratories</td>
<td>5</td>
</tr>
<tr>
<td>Technology classrooms (e.g. woodwork, metalwork, food science and sewing)</td>
<td>10</td>
</tr>
</tbody>
</table>
Part 2: Firecells, fire safety systems and fire resistance ratings

CONTENTS

2.1 Provision of firecells
2.2 Fire safety systems
2.3 Fire resistance ratings

2.1 Provision of firecells

Firecell floor area limits

2.1.1 The floor area of an unsprinklered firecell shall not exceed 5000 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.

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2.2 Fire safety systems

2.2.1 The fire safety systems for firecells required for this risk group shall be as follows (see also 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 <100 people and <4.0 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 emergency calls. This system is not required if the escape routes serve no more than 50 people in a single-level building (excluding early childhood centres, see Paragraph 2.2.2), and

b) Type 18 building fire hydrant system, unless the Fire Service hose run distance from the point of Fire Service vehicular access to any point on any floor is less than 75 m.

For 100 to 1000 people or 4.0 m to 25 m escape height

a) Type 4 alarm system. A direct connection to the Fire Service is not required if:
   i) there are less than 200 people, and
   ii) the escape height is 0 m, and
   iii) a phone is available at all times for emergency calls, and

   A Type 3 with supplementary smoke detection may be substituted if the environment is challenging for smoke detection.

Comment: Buildings such as cafés, bakeries with seating and other uses involving cooking have difficulties with smoke detection systems.

A Type 6 alarm system may be substituted provided:

i) The occupant load of the building is no greater than 500

ii) Each floor is a separate firecell

iii) Any small intermediate floors comply with Paragraph 4.13.5

iv) There are no sleeping firecells elsewhere in the building.

Additional requirements for early childhood centres are specified in Paragraph 2.2.2

b) Type 9 smoke control in air handling systems, 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.
Unless <250 people and <4.0 m escape height then

a) Type 2 alarm system. Provided the use is not as a cinema, theatre or early childhood centre a direct connection to the Fire Service is not required if a phone is available at all times for emergency calls.

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 >25 m escape height or >1000 people

a) Type 7 sprinkler and alarm system, and

b) Type 9 smoke control in air handling systems, 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.

### Table 2.0 Alarm types for various accommodation types and escape heights

<table>
<thead>
<tr>
<th>Occupant load</th>
<th>Escape height (m)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 4.0</td>
<td>4.0 to 25</td>
<td>&gt; 25</td>
</tr>
<tr>
<td>&lt; 100 people</td>
<td>Type 21, 4, 7</td>
<td>Type 42, 8</td>
<td>Type 7</td>
</tr>
<tr>
<td>100 to 250 people</td>
<td>Type 18</td>
<td>Type 9</td>
<td>Type 9</td>
</tr>
<tr>
<td></td>
<td>Type 181</td>
<td>Type 181</td>
<td>Type 181</td>
</tr>
<tr>
<td>100 to 1000 people</td>
<td>Type 42, 8</td>
<td>Type 9</td>
<td>Type 9</td>
</tr>
<tr>
<td></td>
<td>Type 181</td>
<td>Type 181</td>
<td>Type 181</td>
</tr>
<tr>
<td>&gt; 1000 people</td>
<td>Type 7</td>
<td>Type 7</td>
<td>Type 9</td>
</tr>
<tr>
<td></td>
<td>Type 9</td>
<td>Type 9</td>
<td>Type 181</td>
</tr>
<tr>
<td></td>
<td>Type 181</td>
<td>Type 181</td>
<td>Type 181</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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Special requirements for early childhood centres

2.2.2 In addition to Paragraph 2.2.1, the fire safety systems required for firecells in early childhood centres shall be as follows.

a) In single storey early childhood centres, dedicated sleeping areas shall be protected with supplementary smoke detectors. The alarm system and any smoke detection system shall comply with NZS 4512.

b) Where the escape height of the early childhood centre is greater than 2.0 m, a Type 7 alarm system shall be installed throughout the building.

Comment: Intermediate floors that children are unable to access do not need to be included in the escape height.

The escape height limitation of 2.0 m is used to allow early childhood centres that may be slightly above or below the actual ground floor to be treated as being on the ground floor – for example on a sloping site where there may be a small set of stairs up or down to the centre.

c) If the early childhood centre is located in a multi-storey building other than the ground floor at least two separate places of safety shall be provided. Each place of safety shall be separated with fire separations designed to the property rating and have direct access to a safe path or final exit.

2.2.3 If any firecell in a building requires a manual or automatic fire alarm or sprinkler system, that system shall be provided in all other firecells throughout the building (refer to Figure 2.1). As a Type 5 system (refer to Table 2.1) provides for non-latching smoke detection with heat detection back-up in sleeping spaces, other (non-sleeping) firecells shall be protected with standard automatic smoke detection. Where sleeping spaces are provided in the other firecells they shall be protected with a Type 5 system where a Type 4 is being extended. Smoke detection shall not be extended into risk group VP: heat detection shall be provided instead.

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.

### Table 2.1 Fire safety systems specified in this Acceptable Solution

<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>
<tr>
<td>9</td>
<td>Smoke control in air handling system</td>
<td>AS/NZS 1668.1</td>
</tr>
<tr>
<td>18</td>
<td>Building fire hydrant system</td>
<td>NZS 4510</td>
</tr>
</tbody>
</table>
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.

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.
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.

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2.2.10 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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

Property rating = 120 minutes. This applies to fire rating requirements in Part 5: Control of external fire spread.

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 fire sprinkler system is provided, the FRRs for risk group CA shall be:

Life rating = 30 minutes, and Property rating = 60 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 4.3.3, 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.
c) DELIBERATELY LEFT BLANK

2.3.10 THIS PARAGRAPH DELIBERATELY LEFT BLANK

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

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

c) Parts of *external walls* which are within 2.0 m of an *external exitway* where it is a single *means of escape from fire* (see Paragraph 3.11.2).

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.
Part 3: Means of escape

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.
Figure 3.1 Escape routes
Paragraphs 3.1.1 and 3.1.2

- Degree of protection increases
- Open paths
  - Smoke lobby
  - Safe path
  - Final exit

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.

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, the total required width in unsprinklered firecells 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) **Fixed or loose seating**: the width requirements of Paragraph 3.3.2 a) to d) do not apply to fixed or loose seating.
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)

c) **Fixed seating** (at the start of an escape route) which complies with the requirements of Paragraph 3.7.4 and Table 3.3 for the width of aisles and space between rows, and

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).

### 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 CA. 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).

#### Table 3.2 Travel distances on escape routes for risk group CA

<table>
<thead>
<tr>
<th></th>
<th>No system and Type 2 system</th>
<th>Type 4 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>40 m</td>
<td>40 m</td>
<td>50 m</td>
</tr>
<tr>
<td>Total open path</td>
<td>50 m</td>
<td>100 m</td>
<td>100 m</td>
<td>120 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.*
Each person shall have at least two escape routes available unless exempted by Paragraph 3.4.

(a) FIXTURE AND FITTING POSITIONS KNOWN

Open path lengths include travel around furniture and fittings. Open path not to exceed length in Table 3.2.

(b) FIXTURE AND FITTING POSITIONS UNKNOWN

Open path length = A + B
Open path not to exceed length in Table 3.2.
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:

a) 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

b) The clear ceiling height at any point is less than 4.0 m, and

c) The *occupant load* in the space is more than 50, and

d) 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:

a) 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.

**Figure 3.10** Escape through adjoining building
Paragraphs 3.4.6 and 4.16.9

[Diagram of escape through adjoining building]
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.

Figure 3.11 Single escape route from basement levels
Paragraphs 3.5.2 and 3.13.1 f)

NOTES:
1. Occupant load at each basement level no greater than 50
2. A single escape route is permitted only where there are no more than two basement 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 shall 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.

![Figure 3.12 Alternative open path separation](Errata 1 Feb 2013)

Alternative open paths must continue at minimum of 90° divergence until separated by at least 8.0 m.
Path ABC = less than total open path
Path ABD = less than total open path
**Exception for education buildings**

3.6.3 If a building houses classrooms, laboratories and/or spaces used for home economics, art and crafts, workshops or similar teaching activities, one open path may be via a connecting corridor and the alternative open path may be via connecting doors between adjacent teaching spaces. In such cases, the separation requirements of Paragraph 3.6.2 need not apply provided that:

a) The number of occupants in each teaching space does not exceed 100, and

b) The escape route does not pass through a space which may be locked.

**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.

3.7.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK

**Fixed seating**

3.7.4 Fixed seating, which includes seating that is moveable or foldaway, shall be arranged so that:

a) Direct access to the aisles is available

b) The number of seats in a row is no greater than that specified in Table 3.3

c) The clear walkway width between rows is no less than that specified in Table 3.3, and

The area occupied by each seat plus the walkway in front of it has a total dimension of at least 760 mm from seat back to seat back measured horizontally at right angles to the rows of seats (see Figure 3.13). The seat width must be at least:

i) 500 mm where arms are provided (see Figure 3.13), and

ii) 450 mm where arms are not provided.

### Table 3.3 Walkways in fixed seating

<table>
<thead>
<tr>
<th>Minimum walkway width (mm)</th>
<th>Maximum number of seats in any row</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One aisle</td>
</tr>
<tr>
<td>300</td>
<td>7</td>
</tr>
<tr>
<td>340</td>
<td>9</td>
</tr>
<tr>
<td>380</td>
<td>9</td>
</tr>
<tr>
<td>420</td>
<td>10</td>
</tr>
<tr>
<td>460</td>
<td>11</td>
</tr>
<tr>
<td>500</td>
<td>12</td>
</tr>
</tbody>
</table>

**Aisles**

3.7.5 Aisles serving fixed or loose seating (see Figure 3.14) shall provide access to final exits or escape routes. The width of the final exits or escape routes shall be the greater of the:

a) Aisle width as required by Paragraph 3.7.6, or

b) Width required by Paragraph 3.3.2.

3.7.6 Aisle widths shall be no less than:

a) 750 mm when serving up to 60 seats

b) 900 mm when serving over 60 seats on one side only, or

c) 1100 mm in all other cases.

The minimum width shall occur at:

d) If discharge is in one direction only, the point furthest from the exit door in aisles, or

e) If discharge is in two directions, the mid-length of an aisle to separate cross-aisles or to separate exit doors.

There is nothing to prevent an aisle being made wider than the minimum required. However, to avoid restrictions, this shall be done only in the direction of travel.
3.7.7 Each cross-aisle shall have a width of no less than that of the widest aisle it serves plus 50% of the sum of the widths of all other aisles served.

3.7.8 The travel distance from any seat to a final exit or exitway shall be no greater than allowed for an open path in Table 3.2. If there are sloping ceilings and floors, refer to Paragraph 3.4.5 for further restrictions.

3.7.9 Any side of an aisle that does not provide access to seating shall have barriers complying with Acceptable Solution F4/AS1 and handrails complying with Acceptable Solution D1/AS1.

3.7.10 Steps in aisles shall have equal riser heights and equal tread depths, both complying with the requirements of Acceptable Solution D1/AS1. Landing lengths in aisles shall be equal in each block of seating between cross-aisles, but may be less than the minimum length required by Acceptable Solution D1/AS1.

Comment: This will result in an aisle which has a series of short landings connected by one or more uniform steps.

Loose seating

3.7.11 Loose seating is permitted only on level floors. The layout shall follow the requirements of Paragraphs 3.7.4 to 3.7.7.

3.7.12 Where the occupant load exceeds 250, loose seating shall be interconnected to prevent overturning.

Comment: Generally, seats should be linked rigidly in blocks of at least four seats. Preferably, the block at each end, adjacent to each aisle, should be fastened to the floor. This is made easier if aisle widths are clearly marked on the floor.
Passing into an adjacent firecell

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

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

a) All firecells on the escape route have no fewer than two directions of escape, separated as required by Paragraph 3.6.2, and

b) Adjacent firecells into which evacuation may take place have a floor area sufficient to accommodate not only their own occupants, but also the occupants from the adjacent firecell. This shall be calculated on the basis of the occupant load of the two firecells, and

c) Each firecell has at least one other escape route independent of the route into the adjacent firecell. This other route may be by way of a final exit or via a third firecell provided that the exit from that third firecell is independent of exits from the other two firecells, and

Note: Open path lengths shall be as required by Table 3.2
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 to 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.

---

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

- Fire separations.
- Fire doors in these separations shall open both ways
- Safe path
- Alternative safe path
- Open path can be started up to three times when passing through fire separations
- Firecells
3.8 Dead ends

No more than 50 occupants

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

Ladders

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

Comment:
This provision is principally for situations such as catwalks used intermittently and fly-towers over stages.

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 and 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 is 0.25 m² per person in the stairway. The floor area shall be taken as the area of the first landing plus the plan area of the flights of stairs between the two floor levels plus the areas of any intermediate landings. Additional space shall be provided for door swings.

Comment:
This paragraph does not call up a requirement for a smoke lobby, but when they are required by other parts of this Acceptable Solution, this Paragraph states how smoke lobbies are to be sized.
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 THIS PARAGRAPH DELIBERATELY LEFT BLANK
Safe path length restrictions

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

<table>
<thead>
<tr>
<th></th>
<th>No system and Type 2 system</th>
<th>Type 4 system</th>
<th>Type 6 system</th>
<th>Type 7 system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single direction</td>
<td>20 m</td>
<td>40 m</td>
<td>40 m</td>
<td>60 m</td>
</tr>
<tr>
<td>Two or more directions</td>
<td>150 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 then at least 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.

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.

3.9.11 THIS PARAGRAPH DELIBERATELY LEFT BLANK


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) For 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 by 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, and
   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) and toilet facilities

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

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

3.10.4 Lift landings located in open paths (see Figure 3.17) shall be either 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 Paragraph 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.
Paragraph 3.10.4

A: Smokecell

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

B: Lift doors with smoke control capability

NOTE: Either A or B required

Figure 3.17
Lifts and smoke lobby on open path

Paragraph 3.10.5

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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 if the balcony is large enough to allow separation by distance from the external wall (see Paragraph 3.11.2). Balconies with two directions of escape from all firecell exits are also considered to be safe paths, even if the adjacent external wall has 100% unprotected area.

**Separation by distance**

3.11.2 Separation by distance shall be achieved by:

a) 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 any firecell passed by the external escape route is unsprinklered (see Figure 3.18), or

ii) 1.0 m if all firecells passed by the external escape route are sprinklered, or

---

**Figure 3.18** External escape routes
Paragraph 3.11.2

![Diagram showing external escape routes and separation by distance](image-url)
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 that 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).

c) DELIBERATELY LEFT BLANK

d) For shopfronts, if the exit is onto the footpath it is not required to be fire rated.

Comment:
The relaxation of FRR requirements does not apply where fire rated construction is necessary due to the proximity of a relevant boundary (see Paragraph 5.3).
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 shall 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

Comment:
See Verification Method C/VM2 Appendix A for the method of assigning the Group Number.

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 any external escape route closer than 2.0 m to an external wall than required by Paragraph 3.11.2 shall have an FRR of no less than required by Paragraph 2.3, except that this does not apply if the escape route is a balcony with two directions of escape, and

ii) treads and risers of stairs on external escape routes shall either be constructed from a material with 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

Comment:
If the escape route is a balcony with two directions of escape, the external wall does not need to be a fire separation and the requirements for the floor of the balcony c) i) and the barrier b) do not apply.

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

3.11.9 Open tiered seating decks shall:

a) Have the number of escape routes required by Paragraph 3.2.2 for the occupant load, and

b) Comply with Paragraphs 3.7.4 to 3.7.11 for aisles and walkways between seats (Table 3.3 permits seat numbers to be doubled in this use), and

c) Have exitways spaced at no more than:

i) 60 m apart where the space below the seating deck is required to be fire separated (see Paragraph 4.8.2), or

ii) 20 m apart where the space below requires no fire separation, and

d) Be served by escape routes completely open to the air where the seating deck is not a fire separation.

3.11.10 If the seating deck is required to be a fire separation, an escape route may pass through the deck and the space below, provided that part of the escape route is a safe path with an FRR in accordance with Paragraph 2.3.
3.12 Final exits

3.12.1 Final exits which open onto the same safe place shall be spaced no closer than 5.0 m centre to centre. This applies to both internal and external exitways.

Comment:
This provision allows quick dispersal and reduces the risk of a crowd blocking a final exit.

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 preschool children receiving child care or people with a disabilities (including those using workshops and dining rooms) 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 and the area of the smoke lobby is as specified in Paragraph 3.9.2, 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).

3.15 Doors subdividing escape routes

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 that 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 doors are required to be secure, they shall be fitted with panic fastenings complying with Paragraph 3.15.13 and situated in accordance with Paragraph 3.15.12 or 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 to 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 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 in vertical safe paths, and
c) Open no less than 90°, and
d) Open onto a floor area which:
   i) extends for a distance of no less than the arc of the door swing, and
   ii) is at the same level on both sides of the door for the full width of the escape route, and
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).

Comment:
A 20 mm threshold weather-stop is acceptable on external doors (see Acceptable Solution D1/AS1).
Paragraph 3.15.5 e)

Door opening into escape route is not allowed.

(a) CORRECT DOOR OPENING

(b) INCORRECT DOOR OPENING
Vision panels

3.15.6 Vision panels shall be provided on doors which:
   a) Are hung to swing both ways, or
   b) Lead into, or are within, exitways that swing in the direction of escape, or
   c) Subdivide corridors used as escape routes.

Revolving doors, automatic doors and access control systems

3.15.7 Revolving doors (see Figure 3.24 a)), automatic doors of all types and access control systems shall:
   a) Not be allowed across an escape route at any point leading into or within an exitway, but
   b) Be allowed in an open path or at a final exit provided that, in the event of a power failure or malfunction, the doors or access control systems continue to provide a safe means of escape from fire without reducing the required width by:
      i) automatically opening and remaining open, or
      ii) being readily pushed to the outward open position by the building occupants in an emergency (refer to Figure 3.24 b)).

Comment:
Access control systems may be in the form of turnstiles or entrance gates, in both horizontal and vertical planes. These are usually found in shopping centres, entertainment venues and similar occupancies.
The requirements in ii) are based on the force requirements in Appendix C C6.1.3.

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

Hold-open devices

3.15.9 Detector activated hold-open devices shall be fitted to all 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
   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, and
   e) In early childhood centres located on upper floors of multi-storey buildings.

Comment:
Hold-open devices are used where it is not practical to assume that fire doors and smoke control doors will remain closed because of the type or volume of occupant traffic using these 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
Revolving 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

(b) SLIDING DOORS
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 alarm 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 using a key, but does not release the door under non-emergency conditions until after a time delay. The time delay allows the person intending to use the door to be checked for security reasons.

**Panic fastenings**

3.15.12 Panic fastenings shall be fitted on doors on the means of escape from fire including *exitways* and *final exits* in retail areas serving more than 500 occupants or for crowd occupancies of more than 100 people.

For all other areas, simple fastenings shall be fitted on doors on the means of escape from fire. This includes *exitways* and *final exits* which are required to be secured against entry when a *building* or part of a *building* is occupied.

3.15.13 Panic fastenings are locking devices which shall meet the following requirements:

a) The actuating portion shall consist of a horizontal bar or panel which shall extend across no less than half the width of the door leaf and shall be located between 800 mm and 1200 mm above the floor, and

b) When a horizontal force of that able to be applied using one hand is applied to the bar or panel, the door lock shall release allowing the door to swing open freely.

**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 CA 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).

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 and insulation as the fire separation, except where uninsulated glazing is permitted within vision panels and for sprinklered buildings.

4.2.2 Uninsulated fire resisting glazing having the same integrity value as the fire separation is permitted in fire separations in sprinklered buildings and 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 test for fire resistance may not be as 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 (eg, walls and columns) shall be rated for structural adequacy

b) Primary elements in a horizontal orientation (eg, 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 (eg, mastics, collars and pillows). Each of these is 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

4.5.1 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 the 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).
Figure 4.2  Junctions of fire separations – 1
Paragraphs 4.5.5 and 4.5.7

(a) SECTION

Fire separation

(b) SECTION
JUNCTION FIRE SEPARATION WALL TO ROOFING

See Section A - A
Figure 4.3 (b)

(b) SECTION
Wall or floor

(c) PLAN OR SECTION
JUNCTION FIRE SEPARATION WALL AND FLOOR

Fire separation terminates as close as possible to the roof cladding

Continuous bonded joint

External wall

Wall or floor

(d) PLAN OR SECTION
JUNCTION FIRE SEPARATION WALL AND FLOOR

FRR of floor to be that rating applicable to the firecell below the floor, i.e. Firecell A

Fire stopping
4.6 Specific requirements for theatres

Theatres

4.6.1 In every unsprinklered theatre where the occupant load in the auditorium is greater than 500, the stage area (including workshops, storerooms, scenery docks, property, wardrobe or painting rooms used in connection with the theatre), shall be separated from the auditorium by a proscenium wall meeting the requirements of a fire separation having an FRR of no less than 30/30/30. Where the stage and supporting areas are sprinklered as required by Paragraph 2.2, the proscenium wall and curtain may be a smoke separation.

The openings in fire rated proscenium walls shall be protected as required by Paragraph 4.6.3.

Comment:
In determining the number of occupants on the floor, occupied spaces providing support functions need not be included.

Theatre stages

4.6.2 Theatres with an occupant load of greater than 1000 shall satisfy the following requirements:

a) The stage area shall have roof vents of no less than 5% of the stage floor area, located at the highest point above centre stage. These vents shall have a positive device to keep them closed, and may be of the counterbalanced shutter type, inclined falling type, centre pivot sash type or counterbalanced skylight type, and they shall be held normally in a closed position by a heat sensing device installed below the vent opening and its controls, but above the discharge of any sprinkler head in the vicinity.

b) Vents shall be capable of being operated by a manual control located near the stage safety curtain release, and

c) The heat sensing device required by a) above shall be interlocked with any heating or ventilating system, so that when activated, it closes all fire dampers in all ducts passing through the proscenium wall.
Closures in theatre proscenium walls

4.6.3 The fire resisting closure (see Figure 4.4) to the stage opening in a fire rated proscenium wall shall be a fire curtain with an FRR in accordance with Paragraph 2.3. If the auditorium, stage area, and all spaces used for support activities are sprinklered, the sprinklers, or drenchers complying with NZS 4541, shall be located so that both sides of the fire curtain are kept wet in the event of fire.

4.6.4 The fire curtain, when released, shall free-fall and shall overlap the opening to inhibit the passage of smoke and flames. An emergency curtain release device shall be located in the stage area on both sides of the opening.

4.6.5 If a sprinkler system is not installed, uninsulated glazing is not permitted in fire rated proscenium walls.

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4.7 Specific requirements for exhibition and retail areas

4.7.1 If the occupant load for a sales, exhibition or trade fair space is greater than 500, any adjacent storage areas in which goods are received, unpacked, stored or packed for despatch; any areas used for workshops; and any areas used for the storage of display material or similar items shall be smokecells separated from the display and sales areas.

4.8 Tiered seating

4.8.1 If any enclosed, useable space beneath permanent, tiered seating is not sprinklered, it shall be a firecell with an FRR in accordance with Paragraph 2.3.

4.8.2 If any enclosed, useable space beneath permanent tiered seating is sprinklered, it will not need to be a separate firecell. However, the supporting structure for the permanent tiered seating shall have an FRR in accordance with Paragraph 2.3.

4.8.3 Temporary and retractable tiered seating shall not require an FRR, provided the space beneath the seating is not used for storage.

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. If the escape height is greater than 10 m, the fire separation shall have an FRR meeting the property rating.

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

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

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

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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 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.

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**Notes:**
1. Any glazing in an unsprinklered proscenium wall shall be **insulated**.
2. Where the theatre is sprinkled, either sprinklers or drenchers shall be installed on both sides of the wall above the proscenium opening.
## 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.

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

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**Figure 4.5 Plant, boiler and incinerator rooms**

Paragraph 4.10.3

- At least one wall shall be an exterior wall
- Direct access shall be available from outside at any level
- Floor level no lower than ground level outside if gas is the energy source
- Fire separations
- Internal access via smoke lobby with a heat detector which activates a warning alarm in frequently occupied spaces within the building
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 their 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 protected 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 to 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 either of the following conditions are satisfied:

a) The floor is an intermediate floor within a firecell (see Paragraph 4.13.4 for the 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. The FRR of a floor shall be that rating applicable to the firecell directly below the floor (see Figure 4.6).

Intermediate floors

4.13.3 THIS PARAGRAPH DELIBERATELY LEFT BLANK
4.13.4 Intermediate floors and stairs used as access and their supporting primary elements within the firecell shall have FRRs of at least 30 minutes.

4.13.5 Intermediate floors shall satisfy the following conditions:

a) If there are two or more separate intermediate floors, the levels of these floors above the firecell floors differ by no more than 1.0 m, and

b) The total combined occupant load on the intermediate floors is no greater than 100, and

c) The total combined area of the intermediate floors is no greater than that specified in Paragraph 4.13.6.

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

- 20% of the area of the firecell floor not including the area of the intermediate floors if the intermediate floors are enclosed or partitioned and do not have an alarm system with smoke detection installed throughout the firecell, or

- 40% of the area of the firecell floor not including the area of the intermediate floors if the intermediate floors are either:
  i) completely open, or
  ii) if enclosed or partitioned, a Type 4 system is installed, or

Comment:

If the provision of the smoke detection system is solely to comply with this requirement, Fire Service connection is not required.

- The area that allows up to 100 occupants on the intermediate floors based upon the occupant density of the space as calculated in accordance with Paragraph 1.4.
The smaller (20%) floor area is a concession for spaces which are mainly used for storage with a low occupant density.

Firecells containing intermediate floors require the same fire safety precautions as single level firecells with the same total occupant load and escape heights. Examples of buildings with intermediate floors which could meet these requirements are: churches, halls, small theatres, gymnasiuims and shops.

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 people.

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Flytowers, walkways and similar structures

Intermittently occupied structures such as walkways, ladders, flytowers and gantries that are not used by the public are not required to be fire rated provided that no more than 10 people have access concurrently.

Basement floors

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

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.

4.15 Concealed spaces

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

Concealed spaces within firecells

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 does not extend into another firecell, and

b) The ceiling and its supports and surfaces within the concealed space are 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 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 also causes the ventilation system to switch from circulation to extract as required by Paragraph 4.18.2.
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.

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.
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 of 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 and ceiling space areas shall be subdivided by fire separations or provided with detection in accordance with NZS 4512 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 and for 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 unsprinkled, except as permitted by Paragraphs 4.6.11 and 4.16.12 and plant rooms require an FRR of -/90/30 sm, or

b) An FRR of -/30/- sm if sprinklered, except for plant rooms, which shall have 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 do not need to 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) above.

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.

Glazing in doors

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

Smoke control doors

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

a) 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.
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, as required by Paragraph 4.9.3, isolate the basement section of the vertical safe path.
Figure 4.15 Fire doors
Paragraph 4.16.9

- Fire door between open path and safe path
- Safe path
- Open path
- Fire door
- Safe path
Figure 4.16 Fire doors to separate floors above and below final exit level
Paragraph 4.16.9 d)

- Fire door and fire separations to isolate safe path serving basement level
- Safe path from upper levels 2 and 3
- Final exit level 1
- Final exit
- Upper level 2
- Upper level 3
### Protected 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 8mm 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 or smoke separation shall not reduce the fire resistance and/or smoke separating function of the construction (excluding external walls and roofs) through which the duct passes.

---

**Figure 4.17** Access panels

Paragraph 4.16.10

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.

Where a smoke damper is used to maintain the smoke separating function it shall:

a) comply with AS/NZS 1668.1 and

b) be actuated on alarm activation.

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

---

**Comment:**

Smoke control system shut down on alarm activation, on its own, is not sufficient where a delayed evacuation strategy is in place. The commentary provides further guidance on smoke control in air handling in this case.
**Fire shutters**

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

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

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

**4.17 Interior surface finishes, floor coverings and suspended flexible fabrics**

---

**Surface finish requirements for walls, ceilings, ducts and insulation**

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

<table>
<thead>
<tr>
<th>Table 4.1</th>
<th>Surface finishes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column 1</td>
<td>Exitways</td>
</tr>
<tr>
<td></td>
<td>All occupied</td>
</tr>
<tr>
<td></td>
<td>spaces in</td>
</tr>
<tr>
<td></td>
<td>importance level</td>
</tr>
<tr>
<td></td>
<td>4 buildings</td>
</tr>
<tr>
<td>Column 2</td>
<td>Crowd spaces:</td>
</tr>
<tr>
<td></td>
<td>wall linings</td>
</tr>
<tr>
<td>Column 3</td>
<td>Crowd spaces:</td>
</tr>
<tr>
<td></td>
<td>ceiling linings</td>
</tr>
<tr>
<td>Column 4</td>
<td>All other</td>
</tr>
<tr>
<td></td>
<td>occupied spaces:</td>
</tr>
<tr>
<td></td>
<td>wall and ceiling</td>
</tr>
<tr>
<td></td>
<td>linings</td>
</tr>
<tr>
<td>Column 5</td>
<td>Ducts for HVAC</td>
</tr>
<tr>
<td></td>
<td>systems</td>
</tr>
<tr>
<td>Column 6</td>
<td>– internal</td>
</tr>
<tr>
<td></td>
<td>surfaces</td>
</tr>
<tr>
<td>Column 7</td>
<td>Ducts for HVAC</td>
</tr>
<tr>
<td></td>
<td>systems</td>
</tr>
<tr>
<td></td>
<td>– external</td>
</tr>
<tr>
<td></td>
<td>surfaces</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum permitted Group Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsprinklered</td>
</tr>
<tr>
<td>1S</td>
</tr>
<tr>
<td>2S</td>
</tr>
<tr>
<td>2S</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>1S</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

**Sprinklered**

| 2     |
| 3     |
| 2     |
| 3     |

**Note:** Refer to exceptions in Paragraph 4.17.6.

**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.
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.

Flooring

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

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

<table>
<thead>
<tr>
<th>Area of building</th>
<th>Minimum critical radiant flux when tested to ISO 9239-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings not protected with a fire sprinkler system</td>
<td></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</td>
<td>1.2 kW/m²</td>
</tr>
<tr>
<td>Buildings protected with a fire sprinkler system</td>
<td></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>1.2 kW/m²</td>
</tr>
<tr>
<td>All other occupied spaces</td>
<td>1.2 kW/m²</td>
</tr>
</tbody>
</table>

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.

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 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), and

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.

j) Uniformly distributed roof lights where:

i) the total area does not exceed 15% of the ceiling area (in plan), and

ii) the minimum floor to ceiling height is not less than 6.0 m, and

iii) the roof lights achieve a *Group Number* not greater than 3.

---

**Educational buildings**

4.17.7 Unsprinklered *firecells* containing classrooms, passageways and corridors of educational *buildings* need not comply with Table 4.1 (column 3) provided the following conditions are satisfied:

a) The *occupant load* is less than 250, and

b) The *firecells* are at ground floor level and are served by at least two *exitways* or *final exits*, and

c) The material *Group Number* (assigned as specified in C/VM2 Appendix A) is no more than 2–S for surfaces 1.2 m or more above floor level, and

d) The material *Group Number* is no more than 3 for surfaces less than 1.2 m above floor level.

Comment:
This provision allows for materials such as painted particleboard to be used from floor level to a height of 1.2 m where rapid escape is possible.

**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**

4.17.9 The fabric of structures such as tents, marquees or canopies shall be tested to AS 1530 Part 2 and shall achieve a *flammability index* of no greater than 12.

4.17.10 The requirements for membrane structures need not apply to small *occupant loads* such as camping tents and horticultural applications.

**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.

---

**Building services plant**

4.18 Automatic activation

4.18.1 When any smoke detection system is activated, it shall automatically turn off all air-conditioning and mechanical ventilation plant 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 fire separation of safe paths in Paragraphs 4.9.2 and 4.9.3 shall still apply.
5.2 Horizontal fire spread from external walls

Separation

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

a) If, due to the configuration of a single building or the siting of other buildings on the same property, external walls of adjacent firecells are exposed to each other at an angle of less than 90°, and one or both firecells contain sleeping risk groups or exitways, or

b) If there are unprotected areas in external walls facing a relevant boundary to other property at an angle of less than 90°.

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

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

a) Providing a sprinkler system with a water supply complying with NZS 4541 and consisting of two independent supplies, one of which is not dependent on town mains

b) Distance separation (see Paragraph 5.5)

c) Limiting unprotected areas in external walls (see Paragraph 5.5)

d) Using fire resisting glazing (see Paragraph 5.4).

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

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

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

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

Analysis required for all external walls

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

Notional boundary – firecells on the same property

5.2.8 For firecells under common ownership in the same building or in separate buildings on the same property, a notional boundary shall be used instead of the relevant boundary. In such cases, when applying Tables 5.1, 5.2 and 5.3 the words relevant boundary shall be interpreted as notional boundary.

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

5.3 FRRs of external walls

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

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.
Figure 5.1 Method 1 – Permitted small unprotected areas and fire resisting glazing
Paragraphs 5.4.1 and 5.4.4

Type B areas of fire resisting glazing complying with Table 5.1

Acceptable Solution C/AS4

Dimensions shown are minimum distances between Type A unprotected areas and 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
**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.

<table>
<thead>
<tr>
<th>Table 5.1 Permit areas of fire resisting glazing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance to <em>relevant boundary</em> (m)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>1.0 or less</td>
</tr>
<tr>
<td>1.5</td>
</tr>
<tr>
<td>2.0</td>
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<tr>
<td>15.0</td>
</tr>
</tbody>
</table>

**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 5.2 Separation of unprotected areas

Paragraph 5.5.1

(a) ADJOINING FIRECELLS

(b) SEPARATE BUILDINGS

NOTE: $a = \text{distance to other building}$
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.

5.5.6 If the firecell is wider than 30 m, the external wall shall be divided into a number of 30 m widths and each of these can be assessed separately when considering the size of the largest individual unprotected area.

Comment:
This allowance permits the largest individual unprotected area to be repeated a number of times along the length of a firecell external wall without fire rated construction between each unprotected area.

NOTE: Angle “X” is less than 90°
Table 5.2 Maximum percentage of unprotected area for external walls

<table>
<thead>
<tr>
<th>Risk group CA</th>
<th>Minimum distance to relevant boundary (m) (see Figure 5.3)</th>
<th>Percentage of wall area allowed to be unprotected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Angle between wall and relevant boundary up to 45°</td>
<td>Angle between wall and relevant boundary 46° to 60°</td>
</tr>
<tr>
<td></td>
<td>Width of unsprinklered firecell</td>
<td>Width of sprinklered firecell</td>
</tr>
<tr>
<td></td>
<td>Column 2</td>
<td>Column 3</td>
</tr>
<tr>
<td></td>
<td>Up to 10 m</td>
<td>Greater than 10 m</td>
</tr>
<tr>
<td>Less than 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>55</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>65</td>
<td>45</td>
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<td>10</td>
<td>90</td>
<td>55</td>
</tr>
<tr>
<td>11</td>
<td>100</td>
<td>65</td>
</tr>
<tr>
<td>12</td>
<td>100</td>
<td>70</td>
</tr>
<tr>
<td>13</td>
<td>100</td>
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<td>90</td>
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<td>15</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>16</td>
<td>100</td>
<td>90</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></td>
<td>Maximum largest single unprotected area (m²)</td>
<td>Minimum distance to adjacent unprotected areas (m)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>31</td>
<td>8.5</td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>9.5</td>
</tr>
<tr>
<td>8</td>
<td>51</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>64</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>77</td>
<td>13.5</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.

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

### 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).

**Comment:**
Eaves construction includes the guttering or spouting and any other projections from the eaves, although guttering or spouting need not be fire rated.
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 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, or
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. Those with roof areas of less than 40 m² include 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.
Paragraph 5.6.6

Separation distances for non-fire rated construction

When $A_r$ is no greater than 40 m$^2$, 'Z' shall be no less than 0.3 m. When $A_r$ exceeds 40 m$^2$, 'Z' shall be no less than 1.0 m.

NOTES:
1. This figure applies only to single storey open sided buildings.
2. In all cases at least two sides of the perimeter wall shall be completely open to the environment.
5.7 **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:

a) *Other property*, or

b) Sleeping *risk groups* SI or SM in the same *building* (as the lower roof), or in an adjacent *building* on the same title, or

c) *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) Firecells containing retail areas have an escape height of 7.0 m or more, or

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 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 5.4  Combinations of aprons and spandrels

<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 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 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.

Combustible insulants may include expanded polystyrene (EPS), polyisocyanurate or polyurethane. The insulants may be covered on the exterior side with a sheet material or with a thin rendered cementitious or polymeric coating. However, Paragraph 5.7.17 still applies.
Figure 5.8 Barriers to vertical fire spread in foamed plastics external insulation systems

Paragraph 5.7.17

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(a) Framed cavity wall construction

(b) Concrete or masonry wall construction
5.8 Exterior surface finishes

External walls

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 are 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 The requirements in Paragraph 5.8.1 b) do not apply if the building is sprinklered and has a building height of 25 m or less.

Comment:
Other full-scale façade test methods may also be acceptable to the building consent authority.

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.
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 a 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 for these 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”.

7.4 Downlights

7.4.1 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 where recessed luminaires
are present.
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>Table 7.1 Minimum acceptable dimensions of chimneys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chimney construction</td>
</tr>
<tr>
<td>Chimney construction</td>
</tr>
<tr>
<td>Concrete</td>
</tr>
<tr>
<td>Brickwork</td>
</tr>
<tr>
<td>Precast pumice concrete</td>
</tr>
</tbody>
</table>
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

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DEPARTMENT OF BUILDING AND HOUSING – 10 APRIL 2012  I  115
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 Type 1, 2, 3, 4, 5, 6 and 7.

Type 9 – Smoke control in air handling systems

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

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

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

Type 18 – Fire hydrant systems for buildings

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

B1.1 Introduction

B1.1.1 Wherever sprinklers are required by this Acceptable Solution, they shall comply with the relevant New Zealand Standard, amended as shown in Paragraphs B2.1 and B3.1.

B2.1 Automatic fire sprinkler systems

B2.1.1 NZS 4541 is amended as follows:

Clause 103 Definitions
Sprinkler system A system including:
(a) to (i) No change.
(j) Delete.
(k) Delete.
(l) No change.

Clause 205 Delete entire clause.
Clause 209 Delete entire clause.

Clause 1203 Routine Surveys

Clause 1203.1 Delete first two paragraphs and replace with:

“It is important that a sprinkler system at all times complies with this Standard as amended by Paragraph B2.1 of Appendix B to C/AS4 in all respects. To ensure that building alterations, changes in process or storage patterns or progressive deterioration of system components do not prejudice system compliance, a comprehensive survey shall be carried out biennially at intervals not exceeding 28 months. Such surveys shall be carried out by an independent qualified person.”

B3.1 Residential fire sprinkler systems

B3.1.1 NZS 4515 is amended as follows:

Clause 1.5 Definitions
Sprinkler system A system including:
(a) to (g) No change.
(h) Delete.

Clause 1.11 Delete entire clause.
Clause 2.1.2 Delete.
Clause 2.1.3 Delete.
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 Materials for internal surface linings shall be given a Group Number in accordance with Appendix A of C/VM2 and tested to either:
ISO 5660 Reaction-to-fire tests
Part 1 Heat release rate (cone calorimeter method), and
Part 2 Smoke production rate (dynamic method), or
ISO 9705 Fire tests – Full scale room test for surface products

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

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:

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:


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

a) An applied external heat flux of 50 kW/m², and

b) A test duration of 15 minutes, and

c) The total heat release measured from start of the test, and

d) Sample orientation horizontal, and

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

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

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

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

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