Appendix 8

C1-C6 Protection from Fire, A3 Building Importance Levels

(the Building Code) and Acceptable Solutions

Department of
Building and Housing
Te Tari Kaupapa Whare

Extract from the New Zealand Building Code:

Clauses C1-C6 Protection from Fire

Clause A3 Building Importance Levels

C
BUILDING CODE

This document contains extracts of the New Zealand Building Code Clauses C1–C6 Protection from Fire and A3 Building Importance Levels. The full Building Code is contained in Schedule 1 of the Building Regulations 1992. These regulations can be downloaded from www.legislation.govt.nz

People using this document should check on a regular basis whether new versions have been published. The current version can be downloaded from www.dbh.govt.nz/compliance-documents Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the building controls system in New Zealand and the Building Code.

Defined words (italicised in the text) are explained in the Building Code Clause A2 Interpretation.

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New Zealand Government

C1—OBJECTIVES OF CLAUSES C2 TO C6 (PROTECTION FROM FIRE)

Provisions	Limit on application
The objectives of clauses C2 to C6 are to: (a) safeguard people from an unacceptable risk of injury or illness caused by *fire*, (b) protect *other property* from damage caused by *fire*, and (c) facilitate firefighting and rescue operations.	

C2—PREVENTION OF FIRE OCCURRING

Provisions	Limit on application
FUNCTIONAL REQUIREMENT **C2.1** Fixed appliances using controlled combustion and other fixed equipment must be designed, constructed, and installed in *buildings* in a way that reduces the likelihood of illness or injury due to *fire* occurring. **PERFORMANCE** **C2.2** The maximum surface temperature of *combustible building materials* close to fixed appliances using controlled combustion and other fixed equipment when operating at their design level must not exceed 90°C. **C2.3** Fixed appliances using controlled combustion and other fixed equipment must be designed, constructed and installed so that there is a low probability of explosive or hazardous conditions occurring within any spaces in or around the *building* that contains the appliances.	

C3—FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE

Provisions	Limit on application
FUNCTIONAL REQUIREMENT	
C3.1 *Buildings* must be designed and constructed so that there is a low probability of injury or illness to persons not in close proximity to a *fire source*.	
C3.2 *Buildings* with a *building height* greater than 10 m where upper floors contain sleeping uses or *other property* must be designed and constructed so that there is a low probability of external vertical fire spread to upper floors in the *building*.	Clause C3.2 does not apply to importance level 1 *buildings*.
C3.3 *Buildings* must be designed and constructed so that there is a low probability of *fire* spread to *other property* vertically or horizontally across a *relevant boundary*.	

C3—FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE (continued)

Provisions	Limit on application
PERFORMANCE **C3.4** (a) materials used as internal surface linings in the following areas of *buildings* must meet the performance criteria specified below:	Clause C3.4 does not apply to *detached dwellings*, within *household units* in *multi-unit dwellings*, or *outbuildings* and *ancillary buildings*.

Area of *building*	**Performance determined under conditions described in ISO 9705: 1993**	
	***Buildings* not protected with an automatic *fire* sprinkler system**	***Buildings* protected with an automatic *fire* sprinkler system**
Wall/ceiling materials in sleeping areas where care or detention is provided	Material Group Number 1-S	Material Group Number 1 or 2
Wall/ceiling materials in exitways	Material Group Number 1-S	Material Group Number 1 or 2
Wall/ceiling materials in all *occupied spaces* in importance level 4 *buildings*	Material Group Number 1-S	Material Group Number 1 or 2
Internal surfaces of ducts for *HVAC systems*	Material Group Number 1-S	Material Group Number 1 or 2
Ceiling materials in crowd and sleeping uses except *household units* and where care or detention is provided	Material Group Number 1-S or 2-S	Material Group Number 1 or 2
Wall materials in crowd and sleeping uses except *household units* and where care or detention is provided	Material Group Number 1-S or 2-S	Material Group Number 1, 2, or 3
Wall/ceiling materials in occupied spaces in all other locations in *buildings*, including *household units*	Material Group Number 1, 2, or 3	Material Group Number 1, 2, or 3
External surfaces of ducts for *HVAC systems*	Material Group Number 1, 2, or 3	Material Group Number 1, 2, or 3
Acoustic treatment and pipe insulation within airhandling plenums in sleeping uses	Material Group Number 1, 2, or 3	Material Group Number 1, 2, or 3

C3—FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE (continued)

Provisions	Limit on application
(b) floor surface materials in the following areas of *buildings* must meet the performance criteria specified below:	

Area of *building*	Minimum critical radiant flux when tested to ISO 9239-1: 2010	
	***Buildings* not protected with an automatic *fire* sprinkler system**	***Buildings* protected with an automatic *fire* sprinkler system**
Sleeping areas and exitways in *buildings* where care or detention is provided	4.5 kW/m^2	2.2 kW/m^2
Exitways in all other *buildings*	2.2 kW/m^2	2.2 kW/m^2
Firecells accommodating more than 50 persons	2.2 kW/m^2	1.2 kW/m^2
All other occupied spaces except *household units*	1.2 kW/m^2	1.2 kW/m^2

(c) suspended flexible fabrics and membrane structures used in the construction of *buildings* must have properties resulting in a low probability of injury or illness to persons not in close proximity to a *fire source*.

C3.5 *Buildings* must be designed and constructed so that fire does not spread more than 3.5 m vertically from the *fire source* over the external cladding of multi-level *buildings*.

C3.6 *Buildings* must be designed and constructed so that in the event of *fire* in the building the received radiation at the *relevant boundary* of the property does not exceed 30 kW/m^2 and at a distance of 1 m beyond the relevant boundary of the property does not exceed 16 kW/m^2.

C3—FIRE AFFECTING AREAS BEYOND THE FIRE SOURCE (continued)

Provisions	Limit on application
C3.7 External walls of *buildings* that are located closer than 1 m to the *relevant boundary* of the property on which the *building* stands must either: (a) be constructed from materials which are not *combustible building materials*, or (b) for *buildings* in importance levels 3 and 4, be constructed from materials that, when subjected to a radiant flux of 30 kW/m^2, do not ignite for 30 minutes, or (c) for *buildings* in Importance Levels 1 and 2, be constructed from materials that, when subjected to a radiant flux of 30 kW/m^2, do not ignite for 15 minutes.	
C3.8 *Firecells* located within 15 m of a *relevant boundary* that are not protected by an automatic *fire* sprinkler system, and that contain a *fire load* greater than 20 TJ or that have a floor area greater than 5,000 m^2 must be designed and constructed so that at the time that firefighters first apply water to the *fire*, the maximum radiation flux at 1.5 m above the floor is no greater than 4.5 kW/m^2 and the smoke layer is not less than 2 m above the floor.	
C3.9 *Buildings* must be designed and constructed with regard to the likelihood and consequence of failure of any *fire safety* system intended to control *fire* spread.	

C4—MOVEMENT TO PLACE OF SAFETY

Provisions	Limit on application
FUNCTIONAL REQUIREMENT	
C4.1 *Buildings* must be provided with:	
(a) effective means of giving warning of *fire*, and	
(b) visibility in *escape routes* complying with clause F6.	
C4.2 *Buildings* must be provided with means of escape to ensure that there is a low probability of occupants of those buildings being unreasonably delayed or impeded from moving to a *place of safety* and that those occupants will not suffer injury or illness as a result.	
PERFORMANCE	
C4.3 The *evacuation time* must allow occupants of a building to move to a *place of safety* in the event of a fire so that occupants are not exposed to any of the following:	
(a) a *fractional effective dose* of carbon monoxide greater than 0.3:	
(b) a *fractional effective dose* of thermal effects greater than 0.3:	
(c) conditions where, due to smoke obscuration, visibility is less than 10 m except in rooms of less than 100 m^2 where visibility may fall to 5 m.	
C4.4 Clause C4.3(b) and (c) do not apply where it is not possible to expose more than 1 000 occupants in a *firecell* protected with an automatic *fire* sprinkler system.	
C4.5 Means of escape to a *place of safety* in *buildings* must be designed and constructed with regard to the likelihood and consequence of failure of any *fire safety systems*.	

C5—ACCESS AND SAFETY FOR FIREFIGHTING OPERATIONS

Provisions	Limit on application
FUNCTIONAL REQUIREMENT	
C5.1 *Buildings* must be designed and constructed so that there is a low probability of firefighters or other emergency services personnel being delayed in or impeded from assisting in rescue operations and performing firefighting operations.	
C5.2 *Buildings* must be designed and constructed so that there is a low probability of illness or injury to firefighters or other emergency services personnel during rescue and firefighting operations.	
PERFORMANCE	
C5.3 *Buildings* must be provided with access for fire service vehicles to a hard-standing from which there is an unobstructed path to the *building* within 20 m of: (a) the firefighter access into the *building*, and (b) the inlets to automatic fire sprinkler systems or fire hydrant systems, where these are installed.	Performance requirements in clauses C5.3 to C5.8 do not apply to *backcountry huts, detached dwellings*, within *household units* in *multi-unit dwellings*, or to *outbuildings*, and *ancillary buildings*.
C5.4 Access for fire service vehicles in accordance with clause C5.3 must be provided to more than 1 side of *firecells* greater than 5,000 m^2 in floor area that are not protected by an automatic fire sprinkler system.	
C5.5 *Buildings* must be provided with the means to deliver water for firefighting to all parts of the *building*.	
C5.6 *Buildings* must be designed and constructed in a manner that will allow firefighters, taking into account the firefighters' personal protective equipment and standard training, to: (a) reach the floor of fire origin, (b) search the general area of fire origin, and (c) protect their means of egress.	

C5—ACCESS AND SAFETY FOR FIREFIGHTING OPERATIONS (continued)

Provisions	Limit on application
C5.7 *Buildings* must be provided with means of giving clear information to enable firefighters to: (a) establish the general location of the *fire*, (b) identify the *fire safety systems* available in the *building*, and (c) establish the presence of *hazardous substances* or process in the *building*.	
C5.8 Means to provide access for and safety of firefighters in *buildings* must be designed and constructed with regard to the likelihood and consequence of failure of any *fire safety systems*.	

C6—STRUCTURAL STABILITY

Provisions	Limit on application
FUNCTIONAL REQUIREMENT	
C6.1 Structural systems in *buildings* must be constructed to maintain structural stability during *fire* so that there is: (a) a low probability of injury or illness to occupants, (b) a low probability of injury or illness to *fire* service personnel during rescue and firefighting operations, and (c) a low probability of direct or consequential damage to adjacent *household units* or *other property*.	
PERFORMANCE	
C6.2 Structural systems in *buildings* that are necessary for structural stability in *fire* must be designed and constructed so that they remain stable during *fire* and after *fire* when required to protect *other property* taking into account: (a) the *fire* severity, (b) any automatic fire sprinkler systems within the *buildings*, (c) any other active *fire safety systems* that affect the *fire* severity and its impact on structural stability, and (d) the likelihood and consequence of failure of any *fire safety systems* that affect the *fire* severity and its impact on structural stability.	
C6.3 Structural systems in *buildings* that are necessary to provide firefighters with safe access to floors for the purpose of conducting firefighting and rescue operations must be designed and constructed so that they remain stable during and after *fire*.	
C6.4 Collapse of building elements that have lesser *fire* resistance must not cause the consequential collapse of elements that are required to have a higher *fire* resistance.	

CLAUSE A3—BUILDING IMPORTANCE LEVELS

For the purposes of clause C, a *building* has one of the importance levels set out below:

Importance level	Description of building type	Specific structure
Importance level 1	*Buildings* posing low risk to human life or the environment, or a low economic cost, should the *building* fail. These are typically small non-habitable *buildings*, such as sheds, barns, and the like, that are not normally occupied, though they may have occupants from time to time.	• Ancillary *buildings* not for human habitation • Minor storage facilities • Backcountry huts
Importance level 2	*Buildings* posing normal risk to human life or the environment, or a normal economic cost, should the *building* fail. These are typical residential, commercial, and industrial *buildings*.	• All *buildings* and facilities except those listed in importance levels 1, 3, 4, and 5
Importance level 3	*Buildings* of a higher level of societal benefit or importance, or with higher levels of risk-significant factors to *building* occupants. These *buildings* have increased performance requirements because they may house large numbers of people, vulnerable populations, or occupants with other risk factors, or fulfil a role of increased importance to the local community or to society in general.	• *Buildings* where more than 300 people congregate in 1 area • *Buildings* with primary school, secondary school, or daycare facilities with a capacity greater than 250 • *Buildings* with tertiary or adult education facilities with a capacity greater than 500 • Health care facilities with a capacity of 50 or more residents but not having surgery or emergency treatment facilities • Jails and detention facilities • Any other *building* with a capacity of 5 000 or more people • *Buildings* for power generating facilities, water treatment for potable water, wastewater treatment facilities, and other public utilities facilities not included in importance level 4

CLAUSE A3—BUILDING IMPORTANCE LEVELS (continued)

Importance level	Description of building type	Specific structure
Importance level 3 (continued)		• *Buildings* not included in importance level 4 or 5 containing sufficient quantities of highly toxic gas or explosive materials capable of causing acutely hazardous conditions that do not extend beyond property boundaries
Importance level 4	*Buildings* that are essential to post-disaster recovery or associated with hazardous facilities.	• Hospitals and other health care facilities having surgery or emergency treatment facilities • *Fire*, rescue, and police stations and emergency vehicle garages • *Buildings* intended to be used as emergency shelters • *Buildings* intended by the owner to contribute to emergency preparedness, or to be used for communication, and operation centres in an emergency, and other facilities required for emergency response • Power generating stations and other utilities required as emergency backup facilities for importance level 3 structures • *Buildings* housing highly toxic gas or explosive materials capable of causing acutely hazardous conditions that extend beyond property boundaries • Aviation control towers, air traffic control centres, and emergency aircraft hangars • *Buildings* having critical national defence functions • Water treatment facilities required to maintain water pressure for fire suppression

CLAUSE A3—BUILDING IMPORTANCE LEVELS (continued)

Importance level	Description of building type	Specific structure
Importance level 4 (continued)		• Ancillary *buildings* (including, but not limited to, communication towers, fuel storage tanks or other structures housing or supporting water or other *fire* suppression material or equipment) required for operation of importance level 4 structures during an emergency
Importance level 5	*Buildings* whose failure poses catastrophic risk to a large area (eg, 100 km^2) or a large number of people (eg, 100 000).	• Major dams • Extremely hazardous facilities

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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BUILDING CODE

Protection from Fire
Acceptable Solutions C/AS1 – C/AS7

The requirements of the Building Code clause for Protection from Fire (C) aim to protect people in buildings, limit fire spreading to other buildings, and help firefighting and rescue.

There are seven Acceptable Solutions, C/AS1 to C/AS7, that support the Building Codes clauses for Protection from Fire. Each Acceptable Solution applies to a risk group, which is based on the risk presented by the activities carried out in a building or part of a building.

You must read this with Information Sheet Amendment 3: www.dbh.govt.nz/c-fire-info

These clear and relatively straightforward set of solutions for buildings and parts of buildings can be used by building design professionals including designers who do not necessarily have specific fire engineering qualifications.

The seven Acceptable Solutions for Protection from Fire:

- are for simple buildings without complex features or systems such as multiple mezzanine floors, an atrium, or stair pressurisation systems
- do not require any calculation or modelling other than simple multiplication and
- are intended for use by building professionals who do not necessarily have specific fire engineering qualifications.

A companion document "Commentary on the Acceptable Solutions for Protection from Fire":

- explains the requirements of the Acceptable Solutions and
- records, in some cases, the intent of those requirements.

Download the companion document from www.dbh.govt.nz/compliance-documents

IMPORTANT

If any aspect of a new design, or its features or systems is outside of the scope of the Acceptable Solutions, then:

- **Verification Method C/VM2 can generally be used for that building or firecell, and**
- **The expertise required to apply the Verification Method is likely to be held only by a building professional with specific fire engineering qualifications, such as a Chartered Professional Engineer.**

Want to know more? www.dbh.govt.nz/compliance-documents

Protection from Fire | Acceptable Solutions C/AS1 – C/AS7

Complex buildings and features outside the scope of the Acceptable Solutions

- Warehouse/storage buildings with a storage height of 5m or more, that aren't protected with automatic fire sprinklers.
- Buildings where foamed plastics are manufactured or processed or are part of chemical processing plants.
- Prisons and district health board detention buildings where occupants are unable to self-evacuate due to security features of the building.
- Buildings incorporating an atrium, such as multi-floor shopping malls.
- Intermediate floors that are either larger than the limits specified for limited area intermediate floors or where there may be more than 100 people on intermediate floors.
- Where smoke control is used.
- Buildings more than 20 storeys high (from ground level).
- Stadia or grandstands where tiered seating is provided for more than 2,000 people or where the primary escape routes for more than 100 people are above the level of the playing surface.
- Treatment or care facilities where occupants require a stay-in-place strategy eg, general anaesthetic operations/procedures, delivery rooms, intensive care units, hyperbaric chambers.

What risk group does each Acceptable Solution cover?

Risk Group	Acceptable Solution	Description of building (or building part) use
SH	C/AS1	Houses. That is, detached houses and buildings sub-divided into multiple dwellings, provided that they are a maximum of two units high. There is no limit on the number of units side by side. This Risk Group does not include buildings where there is a corridor or stairway serving more than one dwelling (ie, people from each dwelling have their own independent escape route to a safe place). Outbuildings are also included in this risk group. An outbuilding is a building that is not intended for human habitation and is accessory to the principal use of associated buildings.
SM	C/AS2	Permanent accommodation such as apartments, and temporary accommodation such as hotels, motels, hostels, backpackers and education accommodation. That is, all multiple unit accommodation buildings that are not included in Risk Group SH regardless of whether the accommodation is considered permanent or temporary.

Risk Group	Acceptable Solution	Description of building (or building part) use
SI	C/AS3	Institutions, hospitals, residential care, rest homes, medical day treatment (using sedation), and detention spaces in police stations and courthouses. That is, any space where care is provided to occupants who are in some way incapacitated or are otherwise unable to evacuate without assistance, or would be delayed in their evacuation.
CA	C/AS4	Halls, recreation centres, public libraries (with less than 2.4m storage), cinemas, shops, personal services (dentists and doctors except as included in C/AS3, beautician and hairdressing salons), schools, restaurants and cafes, and early childhood centres. That is, places where people congregate or visit.
WB	C/AS5	Offices (including professional services such as law and accountancy practices), laboratories, workshops, manufacturing (excluding foamed plastics), factories, processing, storage units capable of less than 5m high storage. That is, places where people work (but not including places where personal services are provided which are Risk Group CA).
WS	C/AS6	Warehouses (capable of 5m or more storage), cool stores, and trading and bulk retail (with 3m or more storage). That is, buildings where large quantities of commodities are stored or where the risk is higher than in other Risk Groups.
VP	C/AS7	Vehicle parking within a building or a separate building. That is, any place where vehicles are parked or stored, including car parks, truck and bus parks, stacked boat storage, and light aircraft hangers.

REMEMBER

You need to determine the risk group for all activities carried out in the building. Pick the nearest suitable one if yours is not specifically mentioned in one of the Acceptable Solutions.

If there is more than one risk group for a single firecell, determine its primary risk group (this is the one with the most onerous fire safety requirements).

If a building has more than one firecell and those firecells have different risk groups, you will need to follow more than one Acceptable Solution. For example, a building may contain office space (which is designed to C/AS5) and a car park (designed to C/AS7).

A firecell is a space in a building that is fire separated from all other spaces.

Protection from Fire
Acceptable Solutions C/AS1 – C/AS7

What is an Acceptable Solution (AS)?

An Acceptable Solution details one way to comply with the relevant part of the Building Code. If you follow and meet the requirements of the solution described, your building work will meet that part of the Building Code.

IMPORTANT

Changes were made to the Acceptable Solutions C/AS1 - C/AS7 on 1 July 2014. This information is still valid but you must read it with Information Sheet Amendment 3: www.dbh.govt.nz/c-fire-info

Want to know more? www.dbh.govt.nz/compliance-documents