# Approved Document for New Zealand Building Code Warning Systems Clause F7 Third Edition

Prepared by the Building Industry Authority
This Approved Document is prepared by the Building Industry Authority, which is a statutory body established by the Building Act 1991.

Building Industry Authority

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## Status of Approved Documents

Approved Documents are prepared by the Building Industry Authority in accordance with section 49 of the Building Act 1991. They are non-mandatory guidance documents offering only one method of compliance with specific performance criteria of the New Zealand Building Code.

Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the status of Approved Documents and explains alternative methods of achieving compliance.

Classified uses and defined words which are italicised in the text are explained in clauses A1 and A2 of the New Zealand Building Code.

**F7: Document History**

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Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.

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# New Zealand Building Code Clause F7 Warning Systems

The mandatory provisions for building work are contained in the New Zealand Building Code (NZBC), which comprises the First Schedule to the Building Regulations 1992. The relevant NZBC Clause for Warning Systems is F7.

**FIRST SCHEDULE–*continued***

**Clause F7–WARNING SYSTEMS**

| Provisions | Limits on application |
|---|---|
| **OBJECTIVE**<br>**F7.1** The objective of this provision is to safeguard people from injury or illness due to lack of awareness of an emergency. | |
| **FUNCTIONAL REQUIREMENT**<br>**F7.2** *Buildings* shall be provided with appropriate means of warning people to escape to a *safe place* in an emergency. | |
| **PERFORMANCE**<br>**F7.3.1** A means of warning must alert people to the emergency in *adequate* time for them to reach a *safe place*. | Performance F7.3 does not apply to *Outbuildings* or *Ancillary buildings*. |
| **F7.3.2** Appropriate means of detection and warning for fire must be provided within each *household unit*. | |
| **F7.3.3** Appropriate means of warning for fire and other emergencies must be provided in *buildings* as necessary to satisfy the other performance requirements of this code. | |

Amend 4 Apr 2003

Amend 4 Apr 2003

# Contents



Amend 4 Apr 2003

Amend 4 Apr 2003

# References

For the purposes of New Zealand Building Code compliance, acceptable reference documents include only the quoted edition and specific amendments listed below.

| | | Where quoted |
|---|---|---|
| **Standards New Zealand** | | |
| NZS 4512: 1997 | Fire alarm systems in buildings | AS1 1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.2.2, 1.2.3, 1.2.4, 1.2.6, 1.2.7, 1.3.2, 1.5.1, 2.1.2 b) |
| NZS 4515: 1995 | Fire sprinkler systems for residential occupancies<br>*Amend: 1, 2* | AS1 1.2.8 |
| NZS 4541: 1996 | Automatic fire sprinkler systems | AS1 1.2.8 |
| **British Standards Institution** | | |
| BS 5446:- | Components of automatic fire alarm systems for residential premises | |
| Part 1: 1990 | Specification for self-contained smoke alarms and point-type smoke detectors<br>*Amends: 6863, 7648, 9628* | AS1 3.2.2 |
| **Standards Australia** | | |
| AS/NZS 1668:- | The use of ventilation and air conditioning in buildings | |
| Part 1: 1998 | Fire and smoke control in multi-compartment building | AS1 1.5.3 |
| AS 1670:- | Fire detection, warning, control and intercom systems – System design, installation and commissioning | |
| Part 6: 1997 | Smoke alarms | AS1 3.3.2 |
| AS 3786: 1993 | Smoke alarms<br>*Amends: 1, 2, 3* | AS1 3.2.2 |
| **Underwriters Laboratories Inc** | | |
| UL 217: 1997 | Single and multiple station smoke alarms | AS1 3.2.2 |
| **Underwriters' Laboratories of Canada** | | |
| CAN/ULC S531: 1995 | Smoke alarms | AS1 3.2.2 |

Amend 4 Apr 2003

Amend 4 Apr 2003

# Definitions

See Approved Document C/AS1 for the full list of fire safety definitions.

**Adequate** *Adequate* to achieve the objectives of the *building code*.

**Building** has the meaning ascribed to it by the Building Act 1991.

**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.*

**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 safety precautions (FSPs)** The combination of all methods used in a *building* to warn people of an emergency, provide for safe evacuation, and restrict the spread of *fire*, and includes both active and passive protection.

**COMMENT:**
This definition has the same meaning and wording as the definition of "fire safety systems" in the Building Regulations.

**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** means any *building* or group of *buildings*, or part of any *building* or group of *buildings*, used or intended to be used solely or principally for residential purposes and occupied or intended to be occupied exclusively as the home or residence of not more than one household; but does not include a hostel or boardinghouse or other specialised accommodation.

**HVAC** An abbreviation for heating, ventilating and airconditioning.

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

a) Multiplying the number of people per $m^2$ (occupant density) for the activity being undertaken, by the total floor area, or

b) For sleeping areas, counting the number of beds, or

c) For fixed seating areas, counting the number of seats.

**People with disabilities** means any *person* who suffers from physical or mental disability to such a degree that he or she is seriously limited in the extent to which he or she can engage in the activities, pursuits, and the processes of everyday life.

**Purpose group** The classification of spaces within a *building* according to the activity for which the spaces are used.

**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 of safety in the vicinity of a *building*, 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.*

**Suite** A *firecell* providing residential accommodation for the exclusive use of one person or of several people known to one another. It comprises one or more rooms for sleeping and may include spaces used for associated domestic activities such as hygiene and cooking.

**COMMENT:**

1. Bed numbers are limited to 6 in *purpose groups* SC and SD or 12 in *purpose group* SA in accordance with C/AS1 Paragraphs 6.6.5 and 6.7.6. Examples may be found in hotels, motels and residential care facilities, such as old peoples' homes or in hospices providing temporary family accommodation.

2. It is assumed that the social cohesion of the occupants by virtue of the personal relationship (as family members, friends or associates) would ensure that any individual, becoming aware of *fire*, would naturally assist others within the *firecell* to escape. The term *suite* does not apply to a group of bedrooms where each room is available to different "key-holders". In some cases a *suite* may be a single bedroom.

# Verification Method F7/VM1

No specific test methods have been adopted for verifying compliance with the Performance of NZBC F7.

# Acceptable Solution F7/AS1

## 1.1 Installation and Maintenance of Fire Alarm Systems

### Manual fire alarm systems

**1.1.1** Manual *fire* alarm systems shall be installed and maintained in accordance with NZS 4512 and the specific requirements of this acceptable solution.

**1.1.2** In *buildings*, with no more than three floors, the "monthly" inspections required by NZS 4512 for manual alarm systems, may be performed at no more than 3 monthly intervals:

a) Where there is no provision for sleeping, and total *occupant load* does not exceed 100 in a single-floor *building* or 50 in a two floor *building*, or

b) Where the *building* contains SA or SR *purpose groups* and has:

   i) only a single floor level, or

   ii) two or three floor levels and contains no more than 10 beds or four *suites* for SA occupants, or four *household units* for SR occupants.

c) During the off-season, for a *building* erected especially for seasonal use, provided that the only use of sleeping accommodation is by maintenance staff.

### Automatic fire alarm systems

**1.1.3** Automatic *fire* alarm systems shall be installed and maintained in accordance with NZS 4512 and the specific requirements of this acceptable solution.

**1.1.4** Call points shall be identified in accordance with F8/AS1 or NZS 4512.

**1.1.5** The installation, detectors, control panel, sounders and other components shall comply with the requirements of NZS 4512.

### Smoke detectors

**1.1.6** Smoke detectors are devices that detect the visible or invisible particles of combustion. They shall have a common power supply either at low voltage or by mains voltage, and shall not rely solely on an internal battery for operation.

**1.1.7** High sensitivity smoke detection, very early smoke detection systems or similar may be used only where supported by *fire* engineering calculations.

## 1.2 Descriptions of Alarm Systems

**1.2.1** The types of *fire* alarms to be provided in *buildings* shall be determined in accordance with Part 4 of Approved Document C/AS1. The following text provides specific details on each *fire* alarm system.

### Type 1 – Domestic smoke alarm system

See Paragraph 3.1 – Domestic Smoke Alarm Systems

Amend 4
Apr 2003

### Type 2 – Manual fire alarm system

**1.2.2** A single or multiple zone system with an alarm panel to provide a zone index diagram and defect warning and suitable for connection to the Fire Service. The *fire* alarm shall comply with the relevant sections of NZS 4512.

**Type 3 – Automatic fire alarm system activated by heat detectors and manual call points**

**1.2.3** This system comprises a Type 2 system plus heat detectors and shall be installed in accordance with NZS 4512.

**Type 4 – Automatic fire alarm system activated by smoke detectors and manual call points**

**1.2.4** This system comprises a Type 2 system plus smoke detectors and shall be installed in accordance with NZS 4512.

**Type 5 – Automatic fire alarm system with modified smoke detection and manual call points**

**1.2.5** This system provides an optional alternative to the smoke detection part of Type 4 and Type 7 systems, and is restricted to single *firecells* containing sleeping accommodation, being *household units* in *purpose group* SR or individual *suites* in *purpose group* SA.

**1.2.6** A Type 5 system requires heat detectors or sprinklers (Type 3 or Type 6) in addition to the local smoke alarm system in each *household unit* or *suite firecell*. In *exitways* and common spaces the required Type 4 or Type 7 system shall not be modified. The system installation for Type 3 and Type 4 components shall comply with NZS 4512.

**COMMENT:**
The local smoke alarm system avoids the risk of total *building* evacuation and Fire Service call-out from nuisance false alarms in individual *household units* or *suites*. In the event of *fire*, the Type 3 or Type 6 system will initiate *building* evacuation and call the Fire Service.

**1.2.7** The system installation for the local smoke alarm component shall also comply with NZS 4512, however, the alarm shall be non-latching, shall alert the occupants of *firecell* of origin only, shall initiate a management signal (for *buildings* with a management regime), but shall not initiate a Fire Service call.

**Type 6 – Automatic fire sprinkler system with manual call points**

**1.2.8** This is a combined automatic *fire* sprinkler system and Type 2 alarm. Activation of the sprinklers shall automatically activate the audible alerting devices of the alarm system. Sprinkler installation shall comply with either NZS 4515 (which is limited to smaller *buildings*), or NZS 4541 as modified by Appendix D of Approved Document C/AS1.

**COMMENT:**
NZS 4541 and NZS 4515 require listed quick response sprinklers to be used throughout all *firecells* containing sleeping accommodation, except that fast response or standard response sprinklers may be used in the roof space.

**Type 7 – Automatic fire sprinkler system with smoke detectors and manual call points**

**1.2.9** This is a combined Type 6 and Type 4 alarm system (including a Type 2 system). Sprinkler installation shall comply with the requirements for a Type 6 alarm.

**COMMENT:**
Smoke detectors are used to gain an earlier warning to life-threatening situations than may be achieved from the response of sprinklers, particularly where a smouldering *fire* does not produce enough heat in its early stages to activate a sprinkler head.

## 1.3 Location of Heat and Smoke Detectors

**1.3.1** Table 4.1 of Approved Document C/AS1 describes the appropriate *fire* alarm system for the *purpose group* being considered. Automatic *fire* alarms which include heat detectors or smoke detectors shall have the appropriate detectors installed throughout the *firecells* of that *purpose group*, and the *safe paths*, unless specifically exempted by Table 4.1 of C/AS1.

**1.3.2** Every space shall have at least one detector (heat, smoke or sprinkler). In Type 4 alarm systems, heat detectors shall be used where smoke detectors are not installed. Smoke detectors are not necessary in toilet spaces, provided they are replaced with heat detectors or sprinklers. Detectors must be installed in cupboards or wardrobes where required by NZS 4512, except within *household units* of *purpose group* SR.

**1.3.3** Smoke detectors shall not be installed in any space where the activity occurring in that space may cause a smoke detector to initiate false alarms, e.g. areas for cooking or certain types of processing, or roof and ceiling spaces with difficult access to clean detectors. See Paragraph 1.3.5 for spaces where substitution of smoke detectors is not permitted.

**1.3.4** Alarm systems Types 3 and 6, activated by heat detectors shall have heat detectors or sprinkler heads located throughout the *firecells* concerned, and *safe paths.*

**1.3.5** Except where Table 4.1 of Approved Document C/AS1 has a contrary requirement, alarm systems Types 4 and 7, which include smoke detectors, shall have the smoke detectors installed throughout the *firecells* of the *purpose group* concerned, except that heat detectors may be used in certain circumstances (see Paragraph 1.3.3) where smoke detectors are not appropriate. Substitution of smoke detectors by heat detectors shall not be permitted in:

a) Sleeping spaces in SC, SD, SA and SR *purpose groups*, or

b) Corridors in SC, SD, SA, SR, CS, CL and CM *purpose groups*, or

c) Internal *exitways* in all *purpose groups*.

**COMMENT:**

1. Where cooking and sleeping activities occur in the same space, smoke detectors must be located to minimise the risk of false alarms.

2. Note that a Type 5 system, being a modified Type 4 or 7 system, requires heat detectors or sprinklers throughout the *firecell*.

### Hold-open devices

**1.3.6** Regardless of the type of alarm system, smoke detectors are required for activating the release of *hold-open devices*. Doors held by *hold-open devices* shall be released by a signal generated by a smoke detector. For locations where *hold-open devices* and associated smoke detectors are required, see Approved Document C/AS1 Paragraph 3.17.9.

### Exitway pressurisation

**1.3.7** Smoke detectors shall be placed in all areas of an *exitway* which is to be pressurised (see C/AS1 Paragraphs 6.21.2 and A2.1.1 Type 13).

### Smoke extract systems

**1.3.8** Smoke detectors shall be placed in all smoke reservoirs to initiate mechanical smoke extraction, and to open vents which are part of a smoke control system (see C/AS1 Paragraph A2.1.1 natural smoke venting Type 10 or mechanical smoke extract Type 11).

## 1.4 Placement of Detectors

**1.4.1** Point type smoke detectors shall be located either by a *fire* engineering study, or by meeting all the following requirements for horizontal spacing of detectors:

a) not more than:

10.0 m between detectors

7.0 m from any point of the room

5.0 m from any wall

0.5 m from the high point of a sloping ceiling, and

b) No less than 0.2 m from any wall.

**1.4.2** Any projection below the ceiling (beams, joists etc.) of more than 0.25 m shall constitute a wall, and ceilings with a slope of less than 5° from the horizontal can be considered as having no high point. Detector placement in stairwells shall follow the requirements for sloping ceilings.

## 1.5 Interface with Ancillary Control Systems

**1.5.1** The primary use of the Type 4 and 7 systems is to provide early warning within the *building* and to send signals to the Fire Service when required. These systems may also generate alarm signals which shall be transferred to a separate control panel to activate ancillary *fire safety precautions* in the *building*, in accordance with NZS 4512 Clause 203.

**1.5.2** The ancillary systems for activating *fire safety precautions* shall be identified on the design plans, and may include controls for *hold-open devices* and one or more of the following:

Type 9 Smoke control in air-handling system
Type 10 Natural smoke venting
Type 11 Mechanical smoke extract
Type 13 Pressurisation of *safe paths*
Type 15 Fire Service lift control
Type 16 Emergency lighting in *exitways*.

### HVAC systems

**1.5.3** Smoke detectors which are part of a Type 4 or 7 system shall not be used directly to detect smoke in a *HVAC* system. Where smoke detectors are included in a *HVAC* system, they shall be part of the controls of that system and be installed as required in AS/NZS 1668: Part 1 (see C/AS1 Paragraph A2.1.1 Type 9).

## 2.1 Requirements of Fire Alarm Systems

### Type and method of activation

**2.1.1** Every *fire* alarm system shall be activated by a method appropriate to the *occupant load* and *purpose groups* contained in the *building*. Compliance with Table 4.1 of Approved Document C/AS1 satisfies this requirement.

**2.1.2** *Fire* alarm systems used for *fire safety precautions* 2 to 7 in Table 4.1 of Approved Document C/AS1, shall satisfy all the following requirements:

a) Have a means of communicating with the Fire Service as set out in Paragraph 2.2.

b) Have the *building*, excluding the sprinkler system, zoned as required by NZS 4512.

c) Have alerting devices which may give either audible or visual warning signals, except as allowed for in e) below for *purpose groups* SC and SD.

d) Where a system serves *purpose group* SA, have alerting devices installed in every accommodation unit provided for the use of *people with disabilities.*

e) Where a system serves *purpose groups* SC and SD, alerting devices may be installed so that only staff are informed of the alarm.

**COMMENT:**
This requirement is intended to apply to patient care areas or prison cells where occupants cannot escape without staff assistance; and where audible sounders will cause confusion and unnecessary panic.

f) Where *people with disabilities* are employed, alerting devices shall have both audible and visual warning signals.

## 2.2 Alerting the Fire Service

**2.2.1** Where an alarm system is required by Table 4.1 of Approved Document C/AS1, there shall be available a means of communication with the Fire Service.

**2.2.2** The three means of communication are:

a) A direct connection (approved by the Fire Service) between the alarm system and the Fire Service, or

b) A "111" telephone call to the Fire Service from a continuously attended telephone with outside line access serving all *buildings* connected to the alarm system, and having the main *fire* alarm panel or mimic panel visible to the switchboard operator. A warning device shall be provided to alert the operator of a *fire* alarm in any *building* on the site (see Paragraph 2.2.3 for *purpose groups* SC or SD), or

c) Where Paragraph 2.2.4 applies a telephone (or telephone system) is installed within the *building* and readily accessible at all times to enable "111" calls to be made to the Fire Service.

**2.2.3** Direct connection to the Fire Service is the only acceptable means of communication for *purpose groups* SC and SD.

**2.2.4** Telephone communication using the "111" call system (given in Paragraph 2.2.2 c)) may be used only where specifically permitted by "special application" 'f' in Table 4.1 of Approved Document C/AS1.

**2.2.5** Where direct connection to the Fire Service is either unavailable or impractical, alternative methods of summoning assistance shall be detailed in the plans and specifications.

**COMMENT:**
This makes allowance for remote situations where telephone line communication is impractical.

## 3.1 Domestic Smoke Alarms

**3.1.1** Smoke alarms shall be installed in every *household unit* of *purpose groups* SH and SR where an automatic smoke detection and alarm system is not required by Table 4.1.

**3.1.2** Appendix A and the other paragraphs of F7/AS1 do not apply to the installation of domestic smoke alarms specified under Paragraph 3.1 of F7/AS1. Paragraph 3.1 stands alone and only details the requirements for domestic smoke alarms within *household units* (where an automatic smoke detection and alarm system is not required by Table 4.1).

Amend 4
Apr 2003

## 3.2 Type 1 Domestic Smoke Alarm System

**3.2.1** This system is based around one or more domestic/residential type smoke alarms with integral alerting devices. Coverage shall be limited to selected parts of a single *firecell*, subject to the conditions below:

**3.2.2** Smoke alarms shall be listed or approved by a recognised national authority as complying with at least one of: UL 217, CAN/ULC S531, AS 3786, BS 5446: Part 1.

**3.2.3** The smoke alarms **may** be battery powered and are not required to be interconnected. In addition, they shall provide a hush facility having a minimum duration of 60 seconds.

**COMMENT:**
A hush facility is a button on the smoke alarm which silences the alarm for a limited time after activation. This allows the cause of a nuisance alarm to be cleared without removing the battery to silence the smoke alarm.

**3.2.4** Smoke alarms shall have an alarm test facility readily accessible by the building occupants. This facility may be located on the smoke alarms.

## 3.3 Location of smoke alarms

**3.3.1** Smoke alarms shall be located on the *escape routes* on all levels within the *household unit*. On levels containing the sleeping spaces, the smoke alarms shall be located either:

a) In every sleeping space, or

b) Within 3.0 m of every sleeping space door. In this case, the smoke alarms must be audible to sleeping occupants on the other side of the closed doors.

Amend 4
Apr 2003

**COMMENT:**

Smoke alarms also need to be located so that an alarm is given before the *escape route* from any bedroom becomes blocked by smoke. This includes those parts of *escape routes* on other floors. Although not required by the Acceptable Solution, the interconnection of individual smoke alarms should be considered if audibility is a problem.

Smoke alarms need to be heard by sleeping occupants. In this Acceptable Solution, audibility is assumed if the sound pressure level is 60 dB(A) within the sleeping area with all doors closed.

**3.3.2** Smoke alarms shall be installed on or near the ceiling in accordance with AS 1670.6 and the manufacturer's instructions.

**COMMENT:**

AS 1670.6 gives instructions for the physical location of smoke alarms. Smoke alarms need to be situated on (or near) the ceiling for optimum detection of smoke in a *fire* situation.

Observance of the manufacturer's instructions is important to ensure smoke alarms are physically mounted correctly. Such information is usually device-specific.

## 3.4 Maintenance

**3.4.1** Recommended maintenance procedures are:

a) In-situ annual cleaning with a vacuum cleaner (no disassembly of smoke alarm).

b) Monthly testing by use of the smoke alarm's "test" facility.

**COMMENT:**

These smoke alarms are exempt from the usual ongoing compliance schedule regime. A test facility is necessary to allow basic maintenance by the building owner/occupier.

The above are maintenance procedures that do not require any special technical knowledge, or disassembly of any part of the system.

The other maintenance recommendation is for the smoke alarms to be annually cleaned in-situ using a vacuum cleaner, with no disassembly of the smoke alarm. The purpose of this is to remove dirt and dust from both the outside of the smoke alarm (blocks smoke entry) and the smoke-sensing chamber inside (makes it either less sensitive, or over-sensitive).

It must be recognised that any smoke alarm installed will have a limited service life (approximately 10-15 years maximum) provided it is well maintained and cared for. Gradual deep-seated soiling and degradation of components will eventually necessitate replacement of the smoke alarm units. Lack of maintenance will shorten this lifetime.

Amend 4
Apr 2003

Amend 4
Apr 2003

# Index F7/VM1 & AS1

References are to paragraphs.

Amend 4
Apr 2003