STANDARDS NEW ZEALAND
TE MANA TAUTIKANGA O AOTEAROA

NZS 4512:2021

NZS 4512:2021

NEW ZEALAND STANDARD

Fire detection and alarm systems in buildings

Superseding NZS 4512:2010

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This standard was prepared by the P4512/14 Fire Alarms Committee. The membership of the committee was approved by the New Zealand Standards Approval Board and appointed by the New Zealand Standards Executive under the Standards and Accreditation Act 2015.

The committee consisted of representatives of the following nominating organisations:

Association of Building Compliance

Buildings Officials Institute of New Zealand

Ministry of Business, Innovation & Employment (Building System Performance)

Kaupapa Mahi Turi – Deaf Action New Zealand

Engineering New Zealand

Fire and Emergency New Zealand (Operational)

Fire and Emergency New Zealand (Strategic)

Fire Protection Association of New Zealand (Contractors' Special Interest Group)

Fire Protection Association of New Zealand (Advanced/Innovative Technologies)

Fire Protection Association of New Zealand (Inspectorate Special Interest Group)

Kāinga Ora | Homes and Communities (formerly Housing New Zealand and KiwiBuild)

Institution of Fire Engineers (NZ Branch) (IFE)

Local Government New Zealand | Te Kāhui Kaunihera ō Aotearoa

Te Manatū mō ngā Iwi ō te Moana-nui-ā-Kiwa | Ministry of Pacific Peoples

New Zealand Council of Elders

New Zealand Fire Equipment Manufacturers' Association

Te Tarī Mō Ngā Take Hauātanga | Office for Disability Issues

Society of Fire Protection Engineers – New Zealand Chapter

The Retirement Villages Association of New Zealand

Te Pōkai Tara | Universities New Zealand

Te Whare Wānanga o Waitaha | University of Canterbury

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NOTES

CONTENTS

Figure

REFERENCED DOCUMENTS

Reference is made in this document to the following:

New Zealand standards

NZS 1170:	Structural Design Actions
Part 5:2004	Earthquake actions – New Zealand (incorporating Amendment No. 1, 2016)
NZS 4219:2009	Seismic performance of engineering systems in buildings
NZS 4510:2008	Fire hydrant systems for buildings
NZS 4514:2021	Interconnected smoke alarms for houses
NZS 4515:2009	Fire sprinkler systems for life safety in sleeping occupancies (up to 2000 m^2)
NZS 4541:2020	Automatic fire sprinkler systems
NZS ISO/IEC 17025:2018	General requirements for the competence of testing and calibration laboratories

Joint Australian/New Zealand standards

AS/NZS 1680:- - - -	Interior and workplace lighting
Part 1:2006	General principles and recommendations
AS/NZS 3000:2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3013:2005	Electrical installations – Classification of the fire and mechanical performance of wiring system elements
AS/NZS 3100:2017	Approval and test specification – General requirements for electrical equipment
AS/NZS 4130:2018	Polyethylene (PE) pipes for pressure applications
AS/NZS 5000:- - - -	Electric cables – Polymeric insulated
Part 2:2006	For working voltages up to and including 450/750 V
Part 3:2003	Multicore control cables
AS/NZS ISO/IEC 17020:2013	Conformity assessment – Requirements for the operation of various types of bodies performing inspection
AS/NZS 62368:- - - -	Audio/video, information and communication technology equipment
Part 1:2018	Safety requirements

International standards

DIN 5381:1985	Identification colours
DIN 6164: - - - -	DIN colour chart
Part 2:1980	Specification of colour samples
IEC 62599:- - - -	Alarm systems
Part 2:2010	Electromagnetic compatibility - Immunity requirements for components of fire and security alarm systems
ISO 7240: - - - -	Fire detection and alarm systems
Part 5:2018	Point-type heat detectors
Part 6:2011	Carbon monoxide fire detectors using electro-chemical cells
Part 7:2018	Point-type smoke detectors using scattered light, transmitted light or ionization
Part 8:2014	Point-type fire detectors using a carbon monoxide sensor in combination with a heat sensor
Part 10:2012	Point-type flame detectors
Part 11:2011	Manual call points (Reconfirmed 2007)
Part 12:2014	Line type smoke detectors using a transmitted optical beam
Part 15:2014	Point-type fire detectors using smoke and heat sensors
Part 17:2020	Transmission path isolators
Part 18:2017	Input/output devices
Part 20:2010	Aspirating smoke detectors
Part 22:2017	Smoke-detection equipment for ducts
Part 23:2013	Visual alarm devices
Part 25: 2010	Components using radio transmission paths
Part 27:2016	Point-type fire detectors using a smoke sensor in combination with a carbon-monoxide sensor and, optionally, one or more heat sensors
ISO 9001:2015	Quality management systems – Requirements

American standards

ASTM B117-09	Standard practice for operating salt spray (fog) apparatus
NFPA 72®:2019	National Fire Alarm and Signaling Code®
UL 268:2016 (R2019)	Smoke detectors for fire alarm systems
UL 268A:2008 (R2020)	Smoke detectors for duct application
UL 300:2019	Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment

UL 521:1999 (R2019)	Standard for heat detectors for fire protective signalling systems
UL 1971:2002 (R2018)	Standard for Signaling Devices for the Hearing Impaired

Australian standards

AS 1603:- - - -	Automatic fire detection and alarm systems
Part 1:1997	(R2016) Heat detectors
Part 2:1997	(R2016) Point type smoke detectors
Part 7:1996	(R2016) Optical beam smoke detectors
Part 8:1996	(R2016) Multi-point aspirated smoke detectors
Part 13:1996	(R2016) Duct sampling units
Part 14:2001	Point type carbon monoxide (CO) fire detectors
AS 1670: - - - -	Fire detection, warning, control and intercom systems – System design, installation and commissioning
Part 4:2018	Emergency warning and intercom systems
AS 1851:2012	Routine Service of fire protection systems and equipment
AS 4428: - - - -	Fire detection, warning, control and intercom systems - Control and indicating equipment
Part 4:2016	Emergency intercom control and indicating equipment
Part 16:2020	Emergency warning control and indicating equipment
AS 2220:- - - -	Emergency warning and intercommunication systems in buildings
Part 1:1989	Equipment design and manufacture
AS (ISO) 7240: - - - -	Fire detection and alarm systems
Part 2:2018	Fire detection control and indicating equipment
Part 5:2018	Point-type heat detectors
Part 6:2017	Carbon monoxide fire detectors using electro-chemical cells
Part 7:2018	Point type smoke detectors using scattered light, transmitted light or ionization
Part 8:2007	Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor
Part 10:2018	Point-type flame detectors
Part 12:2018	Line type smoke detectors using a transmitted optical beam
Part 15:2018	Point type fire detectors using smoke and heat sensors
Part 17:2015	Short-circuit isolators
Part 18:2018	Input/output devices
Part 20:2012	Aspirating smoke detectors

Part 22:2018	Smoke detection equipment for ducts
Part 23:2014	Visual alarm devices
Part 25:2015	Components using radio transmission paths
Part 27:2016	Point-type fire detectors using a scattered-light, transmitted-light or ionization smoke sensor, an electrochemical-cell carbon-monoxide sensor and a heat sensor
AS 60529:2004	(R2018) Degrees of protection provided by enclosures (IP Code)
SAA HB 20:1996	(R2018) Graphical symbols for fire protection drawings

British standards

BS 5252:1976	Framework for colour co-ordination for building purposes
BS 5839:- - - -	Fire detection and fire alarm systems for buildings
Part 1:2017	Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises
BS EN 54:- - - -	Fire detection and fire alarm systems
Part 5:2017	Heat detectors. Point heat detectors
Part 7:2018	Smoke detectors. Point smoke detectors that operate using scattered light, transmitted light or ionization
Part 10:2002	Flame detectors. Point detectors
Part 11:2001	Manual call points
Part 12:2015	Smoke detectors. Line detectors using an optical beam
Part 17:2005	Short-circuit isolators
Part 18:2005	Input/output devices
Part 20:2006	Aspirating smoke detectors
Part 22:2015	Resettable line-type heat detectors
Part 23:2010	Fire alarm devices. Visual alarm devices
Part 25:2008	Components using radio links
Part 26:2015	Carbon monoxide detectors. Point detectors.
Part 27:2015	Duct smoke detectors
BS EN 60068:- - - -	Environmental testing
Part 2-1:2007	Tests. Test A. Cold
Part 2-2:2007	Tests. Test B. Dry heat
Part 2-6:2008	Tests. Test Fc. Vibration (sinusoidal)
Part 2-78:2002	Tests. Test Cab: Damp heat, steady state
BS EN 61672:- - - -	Electroacoustics – Sound level meters
Part 1:2013	Specifications

Other publications

Ministry of Business, Innovation & Employment, New Zealand Building Code Acceptable Solutions and Verification Methods.

Fire Protection Association NZ (Inc). FPANZ Code of Practice for Gaseous Fire Suppression Systems.

Fire Protection Association NZ (Inc). FPANZ Code of Practice for Water Mist Fire Protection Systems

Fire Protection Association NZ (Inc). FPANZ Code of Practice for Integrated Building Systems (in preparation)

New Zealand legislation

Building Act 2004

Building Regulations 1992

Building (Forms) Regulations 2004

Electricity (Safety) Regulations 2010

Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations 2018

Fire and Emergency New Zealand Act 2017

Health and Safety at Work Act 2015

Local Government Act 2002

Radiocommunications Regulations 2001

Standards and Accreditation Act 2015

LATEST REVISIONS

Referenced New Zealand and joint Australian/New Zealand standards can be found on www.standards.govt.nz. When using a standard referenced in this document, the user should refer to the exact version listed as subsequent revisions may introduce changes that are incompatible with this standard or other documents that invoke this standard. New versions of referenced standards can be assessed via formal interpretation.

REVIEW OF STANDARDS

Suggestions for improvement of this standard will be welcomed. They should be sent to the Manager, Standards New Zealand, PO Box 1473, Wellington 6140.

FOREWORD

This standard provides a complete specification for the design, manufacture, installation, documentation, and maintenance of building fire detection and alarm systems. It is intended that this revised and updated standard will continue to be cited by the Acceptable Solutions and Verification Methods for the New Zealand Building Code (NZBC), be used as a baseline for the development of Alternative Solutions, and also to facilitate approval of evacuation procedures and schemes under the Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations 2018.

This standard does not specify what type of alarm system or alerting device is required for a particular building. Instead, based on declared functional requirements determined by the system owner, it provides an integrated set of rules for the correct design, manufacture, installation, commissioning, documentation, and maintenance of the system.

This standard is applicable to fire alarm systems in buildings, except for single station or interconnected smoke alarms for houses which are covered in NZS 4514.

This edition is a technical revision of, and supersedes, NZS 4512:2010 Fire detection and alarm systems in buildings. It incorporates material from formal interpretations issued to that standard, changes to technology, referenced standards, NZQA qualifications, and the NZBC Acceptable Solutions and Verification Methods, plus enhancements, corrections, and clarifications requested by a wide range of users.

While specification of a practitioner licensing scheme is beyond the scope of a standard, the review committee was aware of a widely held desire to strengthen formal accountability within the fire protection industry sector. Enhancements have been made to this standard to support such future development.

The intention is to ensure that the standard remains a dynamic document that adapts with the challenges and changes experienced by the fire protection industry. This revision will continue to help prevent loss of life and provide reliable fire protection in the built environment, thereby enhancing well-being for all New Zealanders.

Specifications and guidance for the design and use of visual alerting devices (VADs) have been expanded significantly in anticipation of increased VAD use for alerting the deaf and hard of hearing.

Significant technical changes include: specific new provisions for wireless detection technology, networked systems, and smoke detectors in ducts; a new requirement for power supplies to support the full system alarm load; a requirement for earth fault monitoring; and specific requirements for seismic performance.

Equipment design requirements now include a definition for the normal indicator's operation, a standard '003' cabinet key, a greater level of immunity to electromagnetic interference, enhanced labelling requirements, and acceptance of short-circuit isolators and input/output devices that comply with certain overseas standards.

Changes to installation practice include: increased maximum zone areas; a reduced limit for detector substitution; increased travel distance and clarified location requirements for manual call points; clearer definition of cabling diversity and requirements for

line-type heat and beam-type smoke detectors; additional fault resistance for large alerting systems; greater specification of Type 5 alerting and hush facilities; and new requirements for crimp pin termination and identification of cables. Requirements for safe maintenance access have been clarified. Specific provisions have also been included for the connection of UL 300 restaurant suppression systems, the separation of other fire protection systems, and the need to preserve the integrity of fire and smoke separations.

Testing and commissioning requirements now include additional checks of amplifier loading impedances, alphanumeric display descriptions, line-type heat and beam-type smoke detectors, end-to-end testing of ancillary services interfaces, and an increase to 5% for sample testing of point-type heat detectors. Significant and minor annual test deficiencies have been further defined, and an enhanced escalation and resolution process for unresolved system impairments has been included (including a new serious impairment notice).

Documentation requirements have been expanded and specified in significantly greater detail for all phases of a system's service lifetime, including provisions for off-site storage and wider access to system documentation and test records.

Accredited inspection body inspection and reporting requirements have been specified in greater detail. The installer's Declaration of Completion and the inspector's Certificate of Compliance are now separate forms. Guidelines for the assessment of competence and qualification have been enhanced.

Editorial changes and minor rearrangements have been made throughout the document to improve readability and clarity. This includes a completely new numbering system and a glossary of abbreviations.

As with previous revisions, the provisions of the standard have been based on a combination of field experience, the desire to reduce unwanted alarms, appropriate technology, pragmatic conservatism, cost-effectiveness, and good engineering practice.

TRANSITIONAL PROVISIONS

In order to allow time for equipment design and certification, the changed or new provisions and requirements of the following clauses shall not become effective until 4 years from the date of publication of this standard:

- 2.7.1 (final sentence) Evacuation switch to override both silencing switches
- 2.8.1(i) and (j) Earth fault monitoring
- 2.8.7 Defect history interrogation facility
- 2.10.5.1 Functionality of the Normal indicator and annunciation of abnormal conditions
- 2.12.2, 4.6.16 System power supply to be capable of supplying the full system alarm load (including alerting device inrush current)
- 2.15.1(f) Common '003' key
- 4.6.11 (paragraph 2) Separate sound character and voice message for Type 5 alarms

To allow stocks of the existing system impairment notice (Figure K2 of NZS 4512:2010) to be consumed, they may continue to be used for up to 12 months from the date of publication of this standard.

OUTCOME STATEMENT

Application of this standard will help prevent loss of life and limit fire damage in New Zealand buildings through up-to-date specifications for the design, manufacture, installation, commissioning, and maintenance of fire detection and alarm systems.

New Zealand Standard

Fire detection and alarm systems in buildings

1 GENERAL

1.1 Scope

1.1.1 General

This standard specifies the requirements for fire detection and alarm systems in buildings. It applies to their design, installation, extension, modification, commissioning, testing, maintenance, and documentation.

1.1.2 Application

This standard applies to the following fire alarm systems:

(a) Multi-zone (manual or automatic) – see section 2;

(b) Single-zone (manual or automatic) – see section 3.

1.1.3 Operating temperature range

Equipment installed to this standard is intended to operate within the temperature range 0°C to 40°C. Special precautions will be necessary for more adverse conditions.

1.1.4 Alternative technologies

This standard specifies performance and test requirements for electrical and electronic fire alarm systems. Alternative technologies that do not comply with the specific requirements but give equivalent performance are not necessarily prohibited. In such cases, appraisal testing and certification will need to demonstrate this equivalent performance.

1.2 Objective

The objective of this standard is to provide specifiers, users, manufacturers, suppliers, installers, and maintenance persons with requirements to enable a fire warning from a fire alarm system in a building to operate at the earliest practicable moment to facilitate appropriate emergency measures.

1.3 Interpretation

1.3.1

For the purposes of this standard, the word ‘shall’ refers to requirements that are essential for compliance with the standard, while the word ‘should’ refers to practices that are advised or recommended.

1.3.2

The terms 'normative' and 'informative' have been used in this standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a standard while an 'informative' appendix is only for information and guidance.

1.3.3

Section headings form an integral part of this standard's requirements.

1.3.4 Formal interpretations

1.3.4.1

Requests for interpretations, rulings, or clarifications received by Standards New Zealand directly shall be reviewed by a subcommittee of the Fire Detection and Alarm Systems in Buildings Committee (P4512/14), which prepared this standard in accordance with the Standards and Accreditation Act.

NOTE – The Alarms and Detection Group that was constituted to deal with queries and interpretations of a number of fire protection standards has jurisdiction to interpret the wording of the current published edition of the relevant standard only. Matters not mentioned in the standard are outside the scope of this committee and should be dealt with according to normal business practice.

Requests for formal interpretations, or queries about the interpretation process, should be sent to the Manager, Standards New Zealand, PO Box 1473, Wellington 6140; or emailed to fireinterpretations@standards.govt.nz. Standards New Zealand reserves the right to charge an administration fee for the processing of a request.

1.3.4.2

Formal interpretations shall be made when:

(a) An interpretation of a clause within this standard is required;

(b) There is ambiguity in this standard and clarification is required;

(c) An in-scope matter is not addressed or adequately covered by this standard;

(d) Clarification of wording in this standard is required because it does not achieve the intent agreed to by the committee; or

(e) Fire detection and alarm system failures have been demonstrated and therefore the provisions of this standard are inadequate, and a recommendation on amending the standard is required and is submitted to Standards New Zealand for consideration.

1.3.5 Tolerances

If a specific tolerance or limit is not specified in a measurement, requirement, or test procedure then a tolerance of 5% shall be applied.

No such tolerance shall apply to quantities expressed as limits by the use of expressions such as 'not less than', 'greater than', 'at least', 'not exceeding', 'a minimum of', or the like.

1.3.6 Spacing

When determining the location of detectors, unless otherwise stated, measurement shall be taken from the centre line of the sampling point or sensing element of the device.

1.4 Definitions

For the purposes of this standard the following definitions shall apply:

Accredited inspection body
An organisation that has been independently accredited by an internationally recognised accreditation body to AS/NZS ISO/IEC 17020 (Type A) with a scope of work that includes specified activities in NZS 4512

NOTE – Internationally recognised accreditation bodies are those that are signatories to the ILAC mutual recognition arrangement for inspection, for example IANZ and JAS-ANZ in New Zealand

Addressable fire alarm system
An automatic fire alarm system that can identify at the control unit the status of the individual detectors or manual call points, or the status of groups of detectors or manual call points that are part of a common zone

Alarm transport system
An alarm communications system offering a communication link between two points without necessarily having a dedicated signal path between the two points

Alerting device
A device that gives warning to the occupants of the building that the fire alarm system has been actuated. An alerting device may comprise an audible or visual alarm, or a combination of both

Ambient sound level
The time-average A-weighted sound pressure level measured over a typical noisiest 10-minute period of normal use $L_{Aeq(10min)}$ ignoring transient effects (such as shower or vacuum cleaner)

Analogue detector
See detector

Ancillary services
Functions of a control unit additional to the generation of a fire alarm. See 2.3

Appraisal certificate
A certificate, containing detailed testing results supporting a technical opinion that a specifically identified fire alarm system complies with the requirements of this standard, and which has been issued by a laboratory accredited for that purpose. Laboratories which have been appropriately accredited to NZS ISO/IEC 17025 by an internationally recognised accreditation body are deemed to satisfy this requirement

NOTE – Internationally recognised accreditation bodies are those that are signatories to the ILAC mutual recognition arrangement for testing, for example IANZ in New Zealand

Aspirating smoke detector
See detector

Audible alarm
A sound signal indicating an alarm condition

Automatic fire alarm system
A fire alarm system that can automatically initiate an alarm in response to a fire

Building
Has the same meaning as in the Building Act ➤

Building consent	Has the same meaning as in the Building Act
Building consent authority (BCA)	Has the same meaning and functions as in the Building Act
Certificate of Compliance	See Form 12A
Co-located	Two pieces of equipment are co-located when they are separated by a distance of no more than 5.0 metres (m) and have common access
Compliance schedule	Has the same meaning as in the Building Act
Concealed space	Any part of the non-occupied space within a building that cannot easily be seen into or accessed from an occupied space
Control unit (or Zone control unit)	A cabinet containing equipment for controlling the fire alarm system in one or more zones, and which may also incorporate an indicating unit
Defect warning	See signals
Demarcation point	The place of first termination of a transmission circuit after entering a building, as designated by the telecommunications service provider
Designated exit door	A final door within the building on an escape route that leads to a safe path or safe place NOTE – The building's fire engineering report will provide details of the escape route, safe path, safe place, or final exit
Detector	A device that has a sensor that automatically responds to a physical stimulus from a fire such as gas, heat, or smoke
Analogue detector	A detector which automatically provides information on the level of the fire phenomenon that it monitors to the control unit, which determines the significance of that information
Aspirating smoke detector	A smoke detector having an aspirator mechanism to induce airflow via a pipe network into the detection chamber
Fixed temperature heat detector	A detector designed to operate when the temperature at the detector exceeds a predetermined value
Flame detector	A detector designed to operate in response to the occurrence of flame
Heat detector	A detector designed to operate when the temperature or rate of rise of temperature at the detector exceeds a predetermined value
Line-type detector	A detector in which the sensing element extends along its length
Point-type detector	A detector in which the sensing element is a compact unit of small area

Rate-of-rise heat detector	A detector designed to operate when the rate of temperature rise at the detector exceeds a predetermined value
Smoke detector	A detector designed to operate when the concentration of airborne combustion products exceeds a predetermined level
Ionisation smoke detector	A smoke detector designed to respond when the presence of gaseous or invisible products of combustion causes a change in ionisation currents within the detector
Photoelectric smoke detector	A smoke detector designed to respond to the scattering or absorption of light by suspended particles NOTE – More than one definition can apply to a detector
Emergency warning and intercommunication system (EWIS)	A system which provides emergency warning incorporating alerting devices and loudspeaking voice facilities, and which may also incorporate an intercommunication feature
Escape route	A continuous unobstructed route from an occupied space in a building to a final exit to enable occupants to reach a safe place
Evacuation procedure	Has the same meaning as in the Fire and Emergency New Zealand (Fire Safety, Fire Procedures, and Evacuation schemes) Regulations 2018
Evacuation scheme	Has the same meaning as in the Fire and Emergency New Zealand (Fire Safety, Fire Procedures, and Evacuation schemes) Regulations 2018 NOTE – These regulations require evacuation schemes to be approved by Fire and Emergency New Zealand (FENZ)
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, smoke, flame, or any combination of these
Fire alarm	A condition initiated by activation of a detector or manual call point that results in the activation of alerting devices and (where provided) signalling to a remote receiving centre. See 2.4
Fire alarm signal	See signals
Fire alarm system	An installation of apparatus, which performs specified fire-related functions in response to the operation of a detector, manual call point, or other input. It includes manual call points, detectors (optional), control and indication equipment, alerting devices, interconnections, fittings labels, power supplies, and energy sources. Where the system is connected to a remote receiving centre, it will also include remote signalling devices,

Fire brigade	The expected first emergency responder to a fire alarm NOTE – At the time of publication this would typically be Fire and Emergency New Zealand
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
Fire detection and alarm system	See fire alarm system
Fire door	A doorset, single or multi-leaf, having a specific fire resistance rating, and in certain situations a smoke control capacity, and forming part of a fire separation. The door, in the event of a fire, if not already closed, will close automatically and be self-latching
Fire resistance rating (FRR)	The New Zealand Building Code 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 the criteria for structural adequacy, integrity, and insulation are satisfied, and is presented always in that order
Fixed temperature detector	See detector
Flame detector	See detector
Form 12A	A prescribed form, issued by an Independently Qualified Person (IQP), to be attached to the Building Warrant of Fitness in accordance with the Building (Forms) Regulations 2004, to verify that the inspection, maintenance, and reporting procedures on a compliance schedule for a specified system have been carried out during the previous 12 months NOTE – A Form 12A is also known as a Certificate of Compliance
Heat detector	See detector
Household unit	Has the same meaning as in the Building Act
Independently qualified person (IQP)	Has the same meaning as in the Building Act

Indicating unit	Equipment incorporating devices for indicating the zone (or sector on a sector indicating unit) where an alarm has originated. An indicating unit may incorporate a zone index and may be integral to or separate from a control unit. A fire alarm system may have several indicating units NOTE – The principal fire brigade attendance point is designated the main indicating unit and will incorporate a zone index and firefighter's controls
Isolate	See signals
Latching	A detector, circuit, or system state that is held in the operating condition until manually reset, even after the removal of the cause of operation
Line-type detector	See detector
Listed	Equipment, components, and materials that have been issued an appraisal certificate and listed for fire protection purposes by a recognised test and approval body, and which conform with the requirements of this standard Listing is required for all equipment and components for which this standard either specifies detailed requirements or invokes a specific compliance standard. Typically, these items are: detectors, manual call points, control and indicating equipment, power supplies, battery chargers, tone generators, brigade transmitters, emergency warning and intercommunication systems (EWIS), and self-contained alerting devices Listing is not required for generic items such as batteries, loudspeakers, cable, junction boxes, and miscellaneous fixtures and fittings NOTE – The Fire Protection Association of New Zealand maintains a register of listed equipment, components, and materials
Manual call point	A manually operated device that initiates a fire alarm
Manual fire alarm system	A fire alarm system, which initiates an alarm in response to the operation of a manual call point
Manufacturer	Unless specifically stated otherwise, the company that either manufactures or imports the control unit of a fire alarm system, and is responsible for designating types and makes of components that may be connected to the control unit and the correct method of connection
Multi-zone fire alarm system	A fire alarm system where detectors, or manual call points, or both are located in more than one zone
Non-latching	A detector, circuit, or system state that automatically resets on the removal of the cause of operation

Owner	Has the same meaning as in the Building Act For the purposes of this standard, an 'owner' may also be a delegated representative, or a person who has control of the premises
Person	Has the same meaning as in the Building Act
Point-type detector	See detector
Rate-of-rise detector	See detector
Rated temperature	The operational temperature of a detector's fixed temperature sensing element as specified by the detector manufacturer
Remote cabinet	An enclosure containing multiple connections to fire alarm system circuits and situated at a location remote to the control unit NOTE – This is distinct from a junction box which typically terminates or connects a single circuit or loop. A remote cabinet may also contain fire alarm system equipment
Remote receiving centre	A monitoring centre for taking immediate action as a result of a fire alarm or other off-normal signals, or both of these
Residual sound level	The A-frequency-weighted time-average sound pressure level (SPL) $L_{Aeq(1min)}$ measured when an audible alerting device is not operating, over 1-minute selected to represent the highest sound levels normally experienced at a location
Safety red	A colour approximating either of the following: (a) BS 5252 colour number 04 E 55 (b) DIN 5381/DIN 6164-2 colour 7.5:8.5:3
Sector	An area containing one or more detection zones and permitted to be covered by one control unit. See 4.1.1
Sector indicating unit	A cabinet containing equipment for controlling two or more sectors and normally incorporating an externally visible display
Signals	
Defect warning	A signal indicating an equipment fault condition
Fire alarm	A signal indicating a fire condition
Isolate	A signal indicating that the system is isolated from the remote receiving centre
Single-zone fire alarm system	A limited type fire alarm system for use where all detectors and/or manual call points are located in only one zone
Smoke detector	See detector
Sound pressure level (SPL)	Twenty times the logarithm to the base ten of the ratio of the root-mean-square of a given sound pressure to the reference value of 20 micropascals (μPa), expressed in decibels (dB), symbol L. Subscripts denote the specific settings for measurement

	$L_{Aeq(1min)}$ – A-frequency-weighted 1-minute time-average SPL $L_{Aeq(10min)}$ – A-frequency-weighted 10-minute time-average SPL L_{AFmax} – Maximum A-frequency-weighted F-time-weighted SPL
Sprinkler	A fire suppression or control device that operates automatically when its heat-activated element is heated to its thermal rating or above, allowing water to discharge over a specified area
Staged evacuation	An arrangement whereby a building's alerting devices are zoned such that they are: (a) Activated in part of a building to facilitate the evacuation of the occupants to a place of safety; and/or (b) Activated in a time-phased sequence to enable free flowing evacuation of occupants from multiple parts of the building NOTE – Such operation will typically form part of the building's approved evacuation scheme
Stairway	A series of steps or stairs with or without landings, including all necessary handrails and giving access between two different levels
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. A suite may include transient or educational accommodation but does not include a household unit
Territorial authority (TA)	A council named in Part 2 of Schedule 2 of the Local Government Act 2002
Visual alarm	A steady or flashing visual indication of an alarm condition
Zone	An area uniquely defined by the equipment to assist firefighters in searching for a fire or controlling evacuation NOTE – Search zone(s) and evacuation zone(s) are typically different
Zone control unit	See control unit
Zone index	A combination of diagrams, symbols, and text forming part of an indicating unit, to identify the location of, and general access to, individual zones NOTE – A zone index is often called a 'mimic panel' (if located remotely from the control unit) or a 'fire alarm panel' if integral with a control unit

1.5 Abbreviations

The following abbreviations are used in this standard.

BCA	Building consent authority
BMS	Building management system(s)
CO	Carbon monoxide
DC	Direct current
EMC	Electromagnetic compatibility
EWIS	Emergency warning and intercommunication system(s)
FENZ	Fire and Emergency New Zealand
FPANZ	Fire Protection Association NZ (Inc)
FRR	Fire resistance rating
IANZ	International Accreditation New Zealand
ILAC	International Laboratory Accreditation Cooperation
IP	Internet protocol; Ingress protection (IPxx = a rating to AS 60529)
IQP	Independently qualified person
IT	Information technology
JAS-ANZ	Joint Accreditation System of Australia and New Zealand
LCD	Liquid crystal display
LED	Light-emitting diode
NZBC	New Zealand Building Code
NZQA	New Zealand Qualifications Authority
RF	Radio frequency
RFI	Radio frequency interference
rms	Root mean square
SPL	Sound pressure level
TA	Territorial authority
VAC	Volts alternating current
VDC	Volts direct current
VAD	Visual alerting device

1.6 Declared functional requirements

In order to establish which requirements of the standard apply to a particular fire alarm system, the intended functions of that system shall be nominated by the owner as the system's declared functional requirements taking into account all regulatory, contractual, insurance, or other obligations. The declared functional requirements should at least define the requirements in terms of the following:

(a) To transmit an alarm to summon fire brigade assistance;

(b) To monitor, and signal to a remote location, the presence of faults;

(c) To automatically operate alerting devices to warn building occupants;

(d) To indicate the zone of an operated detector or manual call point;

(e) To initiate or facilitate ancillary fire-related functions defined by the building consent and any other contractually defined functions;

(f) To transmit an alarm to summon some other specified emergency fire-related assistance;

(g) To detect heat, smoke, pre-combustion aerosols, or other fire-related phenomena. Such phenomena shall be characteristic of a fire and shall use appropriate design criteria to minimise the occurrence of unwanted alarms;

(h) Where the declared functional requirements include item (a), the alarm system shall signal directly to a remote receiving centre (by means of a non-verbal message) in accordance with Appendix A.

NOTE – Where it is a declared functional requirement to facilitate staged evacuation, prior consultation shall be undertaken, and agreement established in writing, between the building owner and Fire and Emergency New Zealand to define the performance requirements necessary to gain evacuation scheme approval.

1.7 Types of fire safety systems

Types of fire safety systems referred to in this standard are described in Appendix B.

1.8 Compliance

1.8.1

Only fire alarm systems, which conform in every respect with this standard, shall be deemed to comply with this standard. The installation shall therefore:

(a) Be undertaken by competent and qualified personnel (see 1.10) who have access to all relevant technical instructions published by the manufacturer;

(b) Be in conformity with the manufacturer's instructions;

(c) Be in conformity with all other requirements of this standard;

(d) Use only listed equipment and components (see 1.4); and

(e) Be certified as being compliant by an accredited inspection body.

NOTE – It is the BCA or TA's decision whether or not to accept the above certification.

1.8.2

Any addition to, or modification of, a fire alarm system originally installed to this standard shall also comply with the requirements of this standard and shall be compatible with the system originally installed.

1.8.3

It is necessary, for continued compliance with this standard, that the fire alarm system installed in accordance with this standard shall be inspected, tested, repaired, and maintained in accordance with the requirements of this standard.

1.8.4

A fire alarm system installed in compliance with any standard then current, which was subsequently superseded by this standard (for example, pneumatic systems), may be deemed to comply with this standard provided that:

(a) It remains in good working order;

(b) It is tested and maintained monthly, and annually in accordance with this standard;

(c) Any deficiencies found as a consequence of 1.8.4(b) are remedied; and

(d) Any alterations to the fire alarm system comply with this standard to the extent permitted by the technology of the original system.

In order to maintain compliance with this standard, all fire alarm systems should, as far as possible, be inspected, tested, repaired, and maintained in accordance with this standard.

NOTE – Where full compliance with the current version is not possible, detailed compliance schedule requirements should be submitted to the territorial authority to replace the normal requirement.

1.8.5

Although it might be technically feasible to interchange components of one manufacturer's fire alarm system with those of another manufacturer, this is not permissible unless such options form part of the manufacturer's published instructions.

NOTE – Section 1.8 is to be read as a whole, each situation being treated on its merits. All of 1.8 is applicable to system extensions and alterations, large or small. As a general principle, all new work should comply 'as near as reasonably practicable' with the requirements of this standard, within the capabilities of the existing control unit, wiring, and other components. When a control unit is changed, existing components and wiring do not necessarily have to be upgraded.

1.9 Legislative requirements

Attention is drawn to the need to comply with all relevant legislative requirements including but not limited to:

(a) Building Act;

(b) New Zealand Building Code;

(c) Electricity (Safety) Regulations;

(d) Radiocommunications Regulations;

(e) Health and Safety at Work Act;

(f) Fire and Emergency New Zealand Act; and

(g) Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations.

1.10 Quality of work, competency, and qualifications

All work relating to the design, manufacture, installation, commissioning, and maintenance of fire alarm systems shall be carried out in a thorough and professional manner in accordance with sound trade practice.

All work carried out under this standard shall be performed competently by, or effectively supervised by, competent and appropriately qualified personnel.

A competent person is one who has acquired, through training, qualification, or experience, or a combination of these, the knowledge and skill enabling that person to perform the required task correctly.

NOTE – See also Appendix C.

1.11 Reliability

The construction of all built-up equipment shall be carried out with high inherent reliability as the major objective. Fire alarm systems operate continuously in a wide range of conditions and applications.

2 DESIGN AND CONSTRUCTION – MULTI-ZONE FIRE ALARM SYSTEMS

NOTE – The equipment design requirements for single-zone fire alarm systems are set out in section 3.

2.1 Type and function

2.1.1

The intended function of any particular fire alarm system shall be that declared by the owner in accordance with the list of functional requirements in 1.6.

2.1.2

Fire alarm systems shall automatically indicate the existence of malfunctions listed in 2.8.

2.1.3

Automatic fire alarm systems shall include manual call points to supplement the automatic fire-detecting devices.

2.1.4

In addition, the fire alarm system may be used to initiate ancillary services set out in 2.3.

2.1.5

The fire alarm systems required for buildings are:

(a) Those stated on the building consent for the buildings in which they are installed; or

(b) Existing types of system in unaltered buildings.

NOTE – This standard does not specify which fire alarm system functions are required in any particular building. See also 1.6, 1.7, and 1.9.

2.2 Zones

To assist in locating a fire or other cause of alarm initiation it is necessary to divide the buildings into zones. All the detectors and manual call points in one zone shall be associated with the appropriate indicator on the control unit zone index. All alerting devices in one zone shall operate together except as permitted in Type 5 systems (see 4.6.11).

2.3 Ancillary services

2.3.1

The fire alarm system shall not rely upon the use of equipment shared with other building services (for example, intruder alarm systems, fibre optic modems, internet protocol (IP) routers, IP switches, or information technology (IT) servers) in the performance of any mandatory function.

2.3.2

The control unit may be designed so that, in addition to giving an alarm on the operation of a detector or manual call point, it will initiate but not power other fire-related services or functions such as the actuation of ventilating systems, emergency lighting, lift control,

door closure, computerised graphic displays, building management systems (BMS),or other building services.

2.3.3

Such additional equipment shall be connected to the fire alarm system through a relay, relays, or other similarly effective isolating devices and arranged so that the additional equipment cannot adversely affect the system or prejudice the performance of the system. Such equipment other than the isolating devices shall be contained in a separate compartment.

2.3.4

Voltages in excess of 32 VAC (rms) and 50 VDC associated with ancillary services shall not enter the control unit.

2.3.5

The monitoring of pressure switches, isolation valves, or flow switches in other fire protection systems, for the purpose of operating indicators on an index or summoning service in the event of a defect, may utilise a fire alarm system circuit or address provided the circuit or address is configured not to generate a fire alarm. (See also Appendix D).

2.3.6

The fire alarm system shall not be used to monitor the functioning or failure of any element of the ancillary services not directly related to fire safety. Indicators in accordance with 2.10.6 and manual controls for ancillary services should be provided on or adjacent to the index (see 4.2.9.2).

2.4 Fire alarm

2.4.1

The operation of one or more detectors or manual call points shall result in a fire alarm being given by all of the following:

(a) Alerting devices throughout the building;

(b) A visual indication on the indicating unit for each zone in which a detector or manual call point device operates; and

(c) Initiation of a fire alarm signal to a remote receiving centre where a communication link to such a centre is provided.

The foregoing requirements are optional for detectors installed, additional to the basic coverage, to initiate supplementary actions and smoke detectors installed for local alarm, in compliance with 4.6.11. (See also Appendix D.)

2.4.2

The fire alarm as given by 2.4.1(b) and (c) shall continue in operation until manually reset or isolated per 2.5.4. The fire alarm initiated by additional detectors per 2.4.1 may reset automatically once the device originating the alarm is reset. Resetting facilities shall be in accordance with 2.6.2.

2.4.3

The visual signal specified in 2.4.1(b) shall also be given on any repeater indicating unit, which may be provided to suit fire brigade access.

2.4.4

When audible alerting devices incorporate voice facilities and are also used as part of a public address system, the fire alarm shall override any other signal except those that properly override the fire alarm. (See 2.18.10.)

2.4.5

The operation of a manual call point for a period greater than 1.0 second (s) shall cause the system to latch into the fire alarm condition.

NOTE – A short delay is desirable to prevent false alarms due to contact bounce caused by shock or vibration.

2.4.6

The delay in equipment response to a detector or manual call point operating shall not exceed 15 s. The system shall latch in the fire alarm condition after the delay period.

NOTE – Such delays should be minimised.

2.4.7

An alarm verification facility shall be provided whereby a point-type smoke detector circuit shall operate twice before a fire alarm is signalled unless an analogue detection algorithm is used to provide an equivalent function. Upon the first operation, the detector circuit shall be held reset for a period not exceeding 15 s. During an ensuing period of not less than 90 s and not more than 120 s, further detector operation shall signal a fire alarm without further delay. In this instance, the time period of 2.4.6 is measured from the second operation. The accumulated delay of 2.4.6 and 2.4.7 shall not exceed 30 s.

2.4.8

A fire alarm shall not be given by an equipment defect external to the control units unless the condition exactly reproduces the effect of the operation of a detector or manual call point.

2.4.9

A fire alarm shall not be given by an open circuit (resistance greater than 50 kilohms (kΩ)) or a short circuit (resistance less than 50 Ω) on any zone circuit to a detector or manual call point.

2.4.10

A fire alarm shall not be cancelled by the operation of detectors or manual call points in another zone.

2.4.11

A fire alarm shall override any defect warning signal specified in 2.8, to the extent that the nature of the defect does not prevent the signalling of the fire alarm.

2.4.12

The fire alarm signal to the remote receiving centre shall latch and shall not be overridden by any subsequent condition.

2.4.13

When remote transmission of a fire alarm is initiated, the switching of heavy loads (such as alerting devices) from the same power source shall be delayed for at least 2 s (but note 2.4.6).

2.5 Silencing switches

2.5.1

The fire alarms as specified in 2.4.1(a) shall continue to operate until either the system is restored to normal or a silencing switch is operated.

2.5.2

Two silencing switches shall be incorporated, one inside and the other outside the control unit cabinet. Operation of the outside silencing switch shall result in a defect warning.

The alerting devices shall not reactivate due to a fire alarm condition while either silencing switch remains operated.

2.5.3

The switch inside the cabinet shall be so arranged that it is not possible to leave the alerting devices inoperative when the cabinet is closed and the system is in the normal operational condition.

NOTE – An acceptable arrangement for the switch inside the cabinet is a control on the outside of the cabinet that becomes operable only when the cabinet is open.

2.5.4

The switch outside the cabinet shall be operable by a 'Bulgin 6083/C' patterned key and shall be clearly designated 'SILENCE ALARMS. BRIGADE USE ONLY'. On restoration of this switch to the normal position, fire alarms from activated zones, detectors, or manual call points shall be isolated from indicating and generating further fire alarms until the system is manually reset, and any remotely signalled fire alarm shall be replaced by a defect signal. All non-isolated zones and devices shall continue to function as normal including the remote signalling of fire alarms and the activation of alerting devices. The key shall not be removable in the silence position. Operation of this switch shall not prevent the operation of the alerting devices by any other source.

NOTE – Restoration of the external silence alarms switch will isolate the activated device. This could cause ancillary services (such as smoke extract or stairwell pressurisation systems) to return to normal operation. Where this is undesirable, the ancillary services control system should latch into the fire operation mode and have a fire mode indicator and manual reset facility.

2.5.5

Any other system (for example, a sprinkler system) that can actuate the alerting devices shall incorporate on, or adjacent to, its control unit an external 'Bulgin 6083/C' patterned ➤

key switch, clearly designated 'SILENCE ALARMS. BRIGADE USE ONLY'. Operation of this switch shall not prevent the operation of the alerting devices by any other source. In addition, operation of this switch shall not generate a defect warning via the fire alarm system.

2.6 Manual reset facilities

2.6.1

It shall not be possible to reset the system to normal without having first restored the operated detectors or manual call points.

2.6.2

Resetting shall be accomplished only by the operation of self-restoring type switches mounted inside the cabinet or by other devices fulfilling the same function.

2.7 Evacuation and alert switches

2.7.1

A key-operated switch, operable by a 'Bulgin 6083/C' patterned key, shall be provided for manually activating all of the alerting devices in the building without initiating a call to a remote receiving centre. This shall be used for trial evacuation. The switch shall be labelled 'EVACUATION'. It shall be so connected that it overrides the two silencing switches referred to in 2.5.2 when they are individually or collectively in the silencing position.

2.7.2

Where a particular building has a staged evacuation, or where a staged evacuation is part of the evacuation scheme, a key-operated switch, operable by a 'Bulgin 6083/C' patterned key, shall be provided for manually activating the alert signal in the building without initiating a call to a remote receiving centre. This shall be used for trial alerting. The switch shall be labelled 'ALERT'.

2.7.3

Where there is provision for alerting by zones (staged evacuation), appropriate facilities shall be provided to allow firefighters to start the evacuation alarm in each zone.

2.8 Defect warning

2.8.1

A defect warning shall be given in the event of any of the following occurring:

(a) The average cell voltage (measured with quiescent load current and without assistance from the battery charger) falling below 2.03 V in an unsealed lead acid battery. For other battery types, this threshold voltage should equal the battery manufacturer's specified 50% capacity value measured at the quiescent load;

NOTE – A typical defect warning voltage for a 12 V sealed lead acid battery is 12.2 V.

(b) Abnormally high or low impedance condition (for example, an open or short circuit) of the zone circuit to a detector or manual call point which would prevent that detector or manual call point from initiating a fire alarm as specified in 2.4;

(c) Removal of any detector or manual call point from a circuit;

(d) Absence of any plug-in zone circuit board or relay that control the alerting devices;

(e) Operation of the silencing switch outside the control unit cabinet;

(f) Abnormally high or low impedance condition (for example, an open or short circuit) on the circuit wiring to alerting devices (including wiring to loudspeakers);

(g) Abnormally high or low impedance condition (for example, an open or short circuit) on the connection to any evacuation switch (see 2.7) remotely located from the control unit;

(h) Abnormally high or low impedance condition (for example, an open or short circuit) on the connection to any indicating units remotely located from the control unit;

(i) Any single earth fault to wiring external to the control unit that affects a mandatory function;

(j) Low impedance (less than 5 kΩ) with reference to the building earth of any wiring external to the control unit;

(k) Failure of an addressable device on an addressable fire alarm system, unless the condition exactly reproduces the effect of the operation of a detector or manual call point;

(l) Repeated failure of a watchdog to restart a software program (see 2.26.1);

(m) Failure of a software configuration to pass the data check procedures (see 2.26.2);

(n) Failure of any monitored aspect of an aspirating smoke detector or system;

(o) Failure of any monitored aspect of any other detector;

(p) Failure of any monitored aspect of any wireless equipment or system; or

(q) A fault condition on an associated EWIS.

A defect warning does not need to be given during a fire alarm.

2.8.2

A defect warning shall be given by a visual indicator on the indicating unit and by the initiation of a defect warning signal transmitted to the remote receiving centre. Where such a communication link is not provided, an audible warning shall be provided from a device situated within or external to the control unit (see 2.8.5 and 4.2.8).

2.8.3

The delay in equipment response to the occurrence of a defect condition shall not exceed 60 s. For wireless equipment, this delay may extend to such time as permitted by the standards listed in 2.21.2.

NOTE – For example, ISO 7240.25 allows a maximum of 300 s to recognise and a further 100 s to report a loss of radio communications.

2.8.4

The defect warnings shall automatically cancel within 60 s of removal of the cause of the defect.

2.8.5

The audible device specified in 2.8.2 used for giving a defect warning shall be distinctive and of a different character from the audible fire alarm signal.

2.8.6

Provision may be made for cancelling the audible defect warning by means of a monitored or self-restoring switch external to the control unit. Where such provision is made, the removal of the defect shall automatically reset the audible defect warning circuit.

2.8.7

A facility shall be provided whereby the source of a defect that is no longer present can be determined.

2.9 Manual isolation from remote receiving centre

Facilities shall be provided for manually isolating the normal alarm functions of the system from the remote receiving centre. A mechanism shall also be incorporated to guard against the system inadvertently being left in the isolate mode. Isolating of the system shall initiate an isolate signal being transmitted to the remote receiving centre.

2.10 Indicating units, indicators, and alphanumeric display

2.10.1

Indicators shall be lamps, shutters, light-emitting diodes (LEDs), liquid crystal displays (LCDs), message screens, or other suitable devices appropriate to the system.

2.10.2

Where incandescent filament lamps are used for fire indication, each indicator shall consist of two lamps connected in parallel; the failure of either lamp shall be evident during routine testing.

2.10.3

The operation of one indicator shall not prevent the proper and separate operation of indicators of a minimum of four other zones.

2.10.4

The operation of any alerting device or the transmission of a signal to a remote receiving centre shall not be prevented by failure of any incandescent lamp.

2.10.5 Indicating units

2.10.5.1

Indicating units shall incorporate:

(a) A fire alarm indicator for each zone, coloured red;

(b) A separate common defect warning indicator, coloured amber or yellow; and

(c) A separate common normal condition indicator, coloured green.

The normal condition indicator shall be illuminated whenever the system is operational and there is no fire alarm, defect, isolate, test, off-normal control, or other abnormal condition.

Means shall be provided on the main indicating unit for indicating abnormal conditions. Such means may include visual indicators, alphanumeric display messages, or audible warnings, as appropriate to the condition.

In the absence of a defect condition, the common defect warning indicator may flash at 0.5 hertz (Hz) with a 50% duty cycle to indicate the presence of abnormal conditions not otherwise indicated.

2.10.5.2

Supplementary alarm indicators from an associated system, when installed (for example, sprinkler flow switch, sprinkler operated) shall be coloured red.

2.10.5.3

Ancillary services operated indicators, where required, shall be coloured amber or yellow. Indicators associated with firefighters' emergency services controls (such as air handling) may be coloured according to their function, provided they are clearly separated and distinctive from all other indicators.

2.10.5.4

All indicators shall be clearly labelled.

2.10.6 Indicators

2.10.6.1

Indicators on indicating units, whether forming part of a control unit or not, shall, when operated, clearly and unambiguously indicate their function at a viewing distance of up to 2 m, at any viewing angle up to 30° from the optical centre line, and when illuminated at an incident light level up to 3000 lux.

2.10.6.2

Where indicating units are physically separate from the control unit, the indicators on the control unit need not comply with the 2 m viewing requirement.

2.10.7 Alphanumeric display

Where an alphanumeric display is provided for fire brigade use, or as part of an evacuation scheme or procedure, it shall meet all of the following requirements:

(a) A display that is legible and readable in all light conditions (0 to 3000 lux minimum range);

(b) Letters and numerals with a minimum font height of 4.5 mm;

(c) A display capacity of at least one alarm;

(d) A single operation required to access the next alarm indication. The last indication shall be followed by the first;

(e) Alarm signals retained in chronological order of receipt;

(f) Alarm signal buffer storage with a capacity of not less than 99 alarms, or all possible alarms, whichever is the lesser. Alarms from isolated zones or detectors shall not reduce this requirement;

(g) A display service life expectancy of not less than 10 years;

(h) The following minimum information, clearly identified and simultaneously displayed:

(i) Zone location. A minimum of 23 characters shall be allocated for the description of the alarm zone location

(ii) Zone status (the condition of an alarm zone). Only the following terms (in full or abbreviated, case immaterial, as follows) shall be used: alarm, defect (Def) or fault (Flt), isolated (Isol) or disabled, acknowledged (Ack'd or Ackd)

(iii) Alarm type (in full or abbreviated, case immaterial) as appropriate: for example, smoke, heat, flame, carbon monoxide (CO), flow switch (FSW), manual call point (MCP), pressure switch (PSW), sprinkler (SPR)

(iv) Total number of zones in alarm;

NOTE – Additional information may be displayed such as zone number, alarm, sequence number, detector number, and time.

(i) A display test facility; and

(j) Where an acknowledgement facility is provided this shall, when operated, cause the zone status indication to display an acknowledgment of the alarm signal displayed. The acknowledge function shall not cause any change of status of any output signal, such as alerting device or remote signalling.

NOTE – Despite not being required to have LED indicators, an alphanumeric display is considered to be an indicating unit for the purposes of this standard.

2.11 Electrical supply

2.11.1

Power supplies to the fire alarm system shall consist of either a combination mains-powered supply/battery charger and a rechargeable battery or alternatively a non-rechargeable battery, which may be provided with a mains power supply unit. The mains-powered supply or battery charger may be mounted within, or external to, the equipment cabinet, but its wiring and construction shall provide adequate electrical safety protection for compliance with the Electricity (Safety) Regulations even when the cabinet door is open. The voltage at which the control and indicating equipment operates shall not exceed 50 VAC or 32 VDC.

NOTE – This is not intended to preclude the use of industry standard signalling voltages such as the '100 V line' levels commonly used to drive loudspeakers. Where such voltages are used, attention is drawn to the need for the installation and servicing to comply with the Electricity (Safety) Regulations.

2.11.2

Alerting devices and multi-point aspirating smoke detector systems may be powered either:

(a) From the same battery and power supply as the control and indicating equipment; or

(b) From an independent battery supply provided that each battery supply is independently monitored in accordance with 2.8, and any rechargeable battery has its own charger in accordance with 2.12.

Where the type of alerting device is not suited to being powered by either of the above means an alternative power source may be used. This shall be an independent source of equivalent reliability.

2.11.3

The electrical supplies to a fire alarm system shall be exclusive to the system.

2.11.4

The wiring from any battery shall be protected by overcurrent devices of appropriate rating.

2.11.5

The fire alarm system equipment shall perform all its required functions over the whole voltage range of the nominal battery voltage ± 20% and the standard mains voltage ± 10%.

NOTE – For the purposes of this standard the nominal voltage is defined as 2 V for lead acid cells.

2.11.6

Complete failure of the electrical power supply of the control unit shall not initiate a fire signal.

NOTE – See A3 for power supplies for transmitting devices.

2.12 Battery charger

2.12.1

The charger for a rechargeable battery shall be capable of restoring the capacity stated in 2.13.1 within a period of 24 hours (h) while carrying any non-alarm load normally supplied by that charger (see 5.3(h)).

NOTE – The non-alarm load is the sum of all quiescent current and defect warning equipment currents. The maximum alarm load is the sum of the load currents with all zones in alarm mode and all alerting devices operating.

2.12.2

The mains power supply/charger shall be capable of supplying the full alarm load of the system without support from the battery.

2.12.3

Automatic output control shall maintain the charge within the levels specified by the battery manufacturer.

2.12.4

Automatic control shall also limit the output current to the maximum rated value of the charger when lead acid batteries discharged to 1.85 V per cell are connected to the system.

2.12.5

For lead acid batteries the 'float' voltage (with the system connected for normal usage) shall be maintained within 2.20 ± 0.03 V per cell unless different voltages are specified by the battery manufacturer.

2.12.6

The battery charger current shall be automatically inhibited for a specific period at regular intervals to allow the battery voltage to be sampled without the assistance of the battery charger. A fire alarm shall not be given by a battery failure during these tests. Two tests shall be carried out as follows:

(a) A short duration test to check that the battery is connected. This test shall inhibit the battery charger current for a brief period so that a defect warning is given if the battery is disconnected or if the battery fuse is blown. A continuous defect warning shall be generated for the duration of the fault. The interval between the tests shall not exceed 30 s; and

(b) An extended test period to check battery capacity. This test shall inhibit the battery charger current for a duration between 30 minutes (min) and 90 min. The interval between the tests shall not be less than 20 h, nor greater than 72 h. A defect warning shall be given within 60 s should the battery voltage fall below the level specified by 2.8.1(a) and shall latch until the end of the extended test period. At the end of the test period the defect shall be unlatched. On test failure, the battery charger may be reconnected immediately provided the defect warning remains latched until the end of the extended test period.

2.13 Rechargeable batteries

2.13.1

The nominal capacity at 20°C of any battery normally supplying a non-alarm load shall be sufficient to supply the non-alarm load for a period of at least 24 h when the system is connected to a remote receiving centre or 72 h when no such connection is made. Thereafter it shall be capable of supplying the maximum alarm load for at least 30 min (see 5.3(g)).

2.13.2

The nominal capacity of a battery which supplies alarm load shall be sufficient to supply that load for at least 30 min.

2.13.3

A battery which supplies alarm load only may be used as a back-up for a battery supplying non-alarm load but not vice-versa. No reduction in capacity is permitted.

2.13.4

The battery shall be suitable for continuous operation under float charge conditions and shall meet the requirements of 2.22.

2.13.5

The battery shall be designed for stationary use and shall have a manufacturer's specified service life of at least 5 years.

2.13.6

For batteries with non-sealed cells, the level of electrolyte shall be readily and easily adjusted, and gas vents shall be designed to effectively prevent electrolyte loss.

2.14 Non-rechargeable batteries

The nominal capacity of the non-rechargeable battery shall be sufficient to supply the non-alarm load for a period of at least 12 months. Thereafter it shall be capable of supplying the maximum alarm load for at least 30 min.

2.15 Construction of control and indicating equipment and power supplies

2.15.1 Construction

Cabinets shall be designed and constructed to meet the requirements of 1.11 and provide all of the following:

(a) Adequate strength and rigidity;

(b) Protection from dust, vermin, or other foreign materials which would adversely affect the operation of the equipment;

(c) Resistance to the adverse effects of moisture;

(d) Adequate access for maintenance purposes;

(e) Secure attachment for all internal components and assemblies;

(f) Access by '003' pattern Australian Emergency Services key; and

(g) A means of preventing the resetting of isolating switches by inadvertent cabinet door closure. This may be by the use of door latches or other mechanisms appropriate to the system.

Attention is drawn to the need for the system, when installed, to comply with the seismic performance requirements of 4.2.22.

2.15.2 Manual controls

2.15.2.1

All manual controls shall be of robust construction, positive in operation, and designed and positioned to avoid accidental operation.

2.15.2.2

Controls for switching off part of the equipment, resetting, or isolating shall not be accessible to unauthorised persons.

2.15.3 Internal wiring

2.15.3.1

Conductors shall have adequate current-carrying capacity and mechanical strength.

2.15.3.2

All wiring shall be neatly run and firmly held in position.

NOTE – Self-adhesive cable ties have shown poor durability and are not recommended.

2.15.3.3

Any wiring between hinged and fixed sections of the control and indicating equipment shall be carried out with stranded conductors in such a manner that hinged sections can be opened without impediment and without placing tension on the wiring, and so that wear to insulation of the wiring is minimised.

2.15.3.4

Wire-ways shall be smooth and free of sharp edges, burrs, moving parts, and the like which could cause abrasion of the conductor insulation.

2.15.3.5

Holes in metal partitions through which insulated conductors pass shall have either smoothly rounded bushings or smooth well-rounded edges.

2.15.3.6

All connections shall be of a standard that meets the reliability requirements of 1.11 (for example, soldered or wire wrapped).

2.15.4 Electrical components

2.15.4.1

Lamps that have two filaments in one envelope shall not be used.

2.15.4.2

All friction contact surfaces shall be of suitable material and rating for the application and shall be sufficient to withstand normal maintenance and servicing requirements.

2.15.4.3

All contacts of relays and other electromechanical devices shall be fitted with dustproof covers.

2.15.5 Circuit design

2.15.5.1

Circuits shall be designed so that the control and indicating equipment will perform all its functions under the test requirements of 2.22.

2.15.5.2

Equipment design shall ensure that the operating conditions of the components shall not exceed the limits specified by the component manufacturer.

2.15.6 Termination of external wiring

External wiring shall be terminated on purpose-made connections suitably labelled and via entry-exit wire-ways of adequate size to prevent damage to the fully equipped control unit.

Audio output terminals shall have the safeguards (insulation and marking) specified in Table E.1 of AS/NZS 62368.1.

2.16 Detection system

2.16.1

Heat detectors shall comply with Appendix E, UL 521, BS EN 54-5, BS EN 54-22, ISO 7240-5, AS 7240.5, or AS 1603.1.

2.16.2

Smoke detectors shall comply with AS 1603.2, AS 1603.7, AS 1603.8, AS 7240.7, AS 7240.12, AS 7240.20, ISO 7240-7, ISO 7240-12, ISO 7240-20, UL 268, BS EN 54-7, BS EN 54-12, or BS EN 54-20.

2.16.3

Flame detectors shall comply with AS 7240.10, ISO 7240-10, or BS EN 54-10, or shall be approved by Factory Mutual (FM) or Loss Prevention Certification Board (LPCB).

2.16.4

CO detectors shall comply with AS 1603.14, AS 7240.6, BS EN 54-26, or ISO 7240-6, or shall be approved by UL (Underwriters Laboratories) or LPCB (Loss Prevention Certification Board) as suitable for fire detection.

2.16.5

Combination or multi-sensor fire detectors shall comply with ISO 7240-8, ISO 7240-15, ISO 7240-27, UL 268, AS 7240.8, AS 7240.15, or AS 7240.27.

2.16.6

In the foregoing clauses, other national adoptions of the EN 54 series of standards are an acceptable alternative.

2.16.7

All detectors, except for line-type heat detectors, shall provide a visual indication of operation. This indication shall latch in the alarm condition until manually reset from the control unit unless the detector is used only for a non-latching local alarm (for example 4.6.11). Only one such detector (or manual call point) indication is required to illuminate at a time per zone.

2.16.8

Where a detector uses a mechanical contact to initiate a fire alarm that contact shall be closed in its normal condition, opening to initiate the fire alarm. This shall not preclude the use of a normally open electromagnetic relay contact to signal a fire alarm, provided the contact is contained in an environmentally protected housing.

2.16.9

A detector shall not rely on the melting of a eutectic alloy to initiate a fire alarm, except as permitted under 1.1.4 and 1.8.4. This shall not preclude the use of line-type heat detectors constructed as a sheathed and supervised two-conductor cable where melting of an insulating separator shorts the conductors to initiate an alarm.

2.16.10

With all detectors or allied devices connected to the zone terminals of the control unit, a 50 kΩ resistance placed across the circuit shall neither prevent a fire being signalled nor initiate a fire signal.

2.16.11

The detection system shall not initiate a fire alarm in response to a decrease in the ambient temperature of 1°C per minute.

2.16.12

The detection system shall not initiate a fire alarm due to the cumulative effect of a number of detectors when these detectors are individually in the non-alarm condition.

2.16.13

Detectors for use in positions exposed to the weather or other wet environments shall either have a degree of protection to at least IP54 of AS 60529 or be encapsulated to prevent the entry of water to any corrodible part of the detector including the field wiring terminations.

2.16.14

Duct housing units for smoke detectors and duct smoke detectors shall comply with at least one of the following: ISO 7240-22, AS 1603.13, AS 7240.22, BS EN 54-27, or UL 268A.

2.16.15

Rate-of-rise heat detectors shall also incorporate a fixed temperature function.

2.17 Manual call points

Manual call points shall comply with the requirements of Appendix F.

2.18 Alerting devices

2.18.1

All alerting devices shall be rated for a minimum 1 h continuous use. Electrical devices shall function satisfactorily within ± 20% of the nominal battery voltage.

2.18.2

For positions exposed to the weather or in other wet environments the alerting devices shall have a degree of protection to at least IP24 of AS 60529.

2.18.3

For a combined detector and alerting device intended for use in positions exposed to the weather or other wet environments, the detection component shall have protection to 2.16.13 and the alerting device component shall have protection to 2.18.2. Any parts of the device shared between the two functions shall have the higher protection rating.

2.18.4

Colour finishing of the visible sections of audible alerting devices shall either be safety red (see 1.4), or else the device or associated sounder grille shall be labelled 'FIRE' in safety red. (See also the readability requirements of 4.6.9.) These requirements do not apply to audible alerting devices which produce a verbal message, nor to alerting devices located on or behind a detector.

NOTE – In addition to the word 'FIRE' the te reo Māori word 'AHI' may also be displayed.

2.18.5

Visual alerting devices (VADs) shall:

(a) Comply with UL 1971, BS EN 54-23, ISO 7240-23, or AS ISO 7240.23;

(b) Be either coloured safety red (see 1.4) or be labelled with the word 'FIRE' and shall flash red or nominal white. Where a VAD is incorporated with a detector the word 'FIRE' is not required; and

NOTE – In addition to the word 'FIRE' the te reo Māori word 'AHI' may also be displayed.

(c) Pulse at a rate between 0.5 Hz and 2 Hz or rotate at a rate between 0.5 Hz and 5 Hz.

Where both Alert and Evacuate/Fire VADs are required, they shall be clearly differentiated by both flash colour and labelling. Alert VADs shall be clearly labelled with the word 'ALERT'. Evacuate/Fire VADs shall be labelled and coloured as per 2.18.5(b).

2.18.6

Where an alerting device is incorporated in a detector or the base of a detector, the detector shall be secured by a locking device that requires the use of a tool to remove the detector if removal of the detector would prevent the correct operation of the alerting device. Isolation of the detection function shall not affect the correct operation of the alerting function.

NOTE – Locking devices may be omitted for detectors mounted more than 3 m above floor level.

2.18.7

Alerting device labelling shall be clear and permanent, and shall include details as follows:

(a) Alerting device manufacturer's name, trade name, or trademark, and type; and

(b) Nominal electrical characteristics (such as the operating voltage and current).

2.18.8

Audible alerting devices:

(a) Shall produce a standardised evacuation signal (including verbal message) complying with Appendix G;

(b) May incorporate loudspeaking voice facilities in order to provide opportunity for, or better means of, evacuation control and testing; and

(c) Where they are able to provide an alert signal, shall produce a standardised alert signal (including verbal message) complying with Appendix G. Alternatively, a pulsed version of the signal of 2.18.8(a) with (non-pulsed) verbal message complying with Appendix G may be used.

Where an EWIS is used to provide the alerting devices, the equipment shall comply with either AS 2220.1, or AS 4428.16 and AS 4428.4 (if applicable) provided that in all cases the DC power supply system and battery capacities also comply with this standard (2.11 to 2.14), and the alerting device signals are as specified in 2.18.8(a) and (c). The brigade silence alarms and evacuation switches (2.5.4 and 2.7.1) shall control the EWIS.

2.18.9

Where the audible alerting devices incorporate voice facilities, the devices may also be used for ancillary services, for example public address announcements.

2.18.10

If public address equipment is used as the alerting device, the following additional conditions shall all be satisfied:

(a) The fire alarm signal shall be a standardised evacuation signal (including verbal message) complying with Appendix G, and shall be easily distinguishable from all management signals;

(b) The fire alarm signal shall be automatically transmitted over the public address system taking priority over, and overriding every other facility of, the public address system except as specified in 2.18.10(c);

(c) The system may, if required, be fitted with an additional microphone for fire purposes designated as 'fire microphone'. This microphone shall be operable only after the fire alarm system has been activated or after operation of an enabling key switch (see 4.6.14) and shall be fitted with a self-restoring 'press to talk' switch;

NOTE – This limitation on the availability of the fire microphone ensures that the initial transmission of the fire alarm signal cannot be inadvertently inhibited by use of the fire microphone for other purposes.

(d) The public address system shall use a monitored power supply to the requirements of 2.11.2;

(e) The circuit wiring to the system loudspeakers shall be monitored for defects (see also 2.8.1(f));

(f) During mains power failure the public address equipment is automatically restricted to the provision of an audible fire alarm signal and the use of the 'fire microphone' if provided;

(g) The public address equipment shall comply with the environmental test requirements of 2.22; and

(h) The fire alarm signal shall not be used for any other purposes.

2.19 Addressable fire alarm systems

2.19.1

An input circuit of an addressable fire alarm system shall be permitted to be extended to cover more than one zone provided the following additional conditions are all satisfied:

(a) The control unit shall divide the annunciation from the detectors or manual call points on the addressable circuit into zones no larger than the area required by this standard (see 4.1);

(b) The addressable system design shall incorporate fault tolerance such that a single short circuit (resistance less than 5 Ω) or an open circuit (resistance greater than 50 kΩ) anywhere on the addressable circuit between the control unit and any detector or manual call point shall result in loss of coverage of no more than one zone as defined by this standard;

(c) Any fault on an addressable circuit which would prevent a detector or manual call point from initiating a fire alarm as specified in 2.4 shall result in a defect warning signal; and

(d) The circuit shall support the simultaneous illumination of at least five detector or manual call point visual indicators of operation.

2.19.2

Short-circuit isolators shall comply with the requirements of this standard. Alternatively, short-circuit isolators complying with BS EN 54-17, ISO 7240-17, or AS ISO 7240-17 may be used provided the control unit manufacturer confirms compatibility as part of the listing process.

2.19.3

Input/output devices shall comply with the requirements of this standard. Alternatively, devices complying with BS EN 54-18, ISO 7240-18, or AS ISO 7240-18 may be used provided the control unit manufacturer confirms compatibility as part of the listing process.

2.20 Networked fire alarm systems

Multiple control units shall be permitted to be interconnected provided the following additional conditions are all satisfied:

(a) A fault in one control unit shall not adversely affect more than that control unit and the associated components controlled by that control unit;

(b) A single fault on a transmission path connecting one control unit to another control unit shall not adversely affect the correct functioning of any part of the networked system;

(c) Means shall be provided for the indication and signalling of a defect on a transmission path connecting one control unit to another control unit;

(d) The delay in transmission of a fire alarm between any two points on the network shall not exceed 20 seconds; and

(e) The delay in transmission of a defect signal between any two points on the network shall not exceed 120 seconds.

NOTE – See also A3.2.

2.21 Wireless detection technology

2.21.1

All radio transmitting devices shall meet the frequency, power, labelling, and compliance requirements as prescribed by the national radiocommunication authorising agency.

2.21.2

All wireless fire alarm components shall comply with ISO 7240-25, AS ISO 7240.25, or BS EN 54-25 in addition to all other relevant requirements of this standard.

2.21.3

Wireless detectors shall comply with the requirements of 2.16, including compliance with an applicable detection standard.

2.21.4

Wireless manual call points shall comply with the requirements of Appendix F, except that a mechanical contact open in the normal condition and closing to initiate a fire alarm may be used.

2.21.5

Where a wireless device incorporates an alerting device the alerting functions shall meet the requirements of 2.18.

2.21.6

Wireless components shall be powered by either an autonomous power source (for example, a non-rechargeable battery) or an electrical supply that meets the requirements of 2.11, 2.12, and 2.13.

2.21.7

Wireless component battery design life shall be at least 2 years, and preferably 3 to 4 years.

NOTE – This is greater than the requirements of 2.14 because such batteries require greater effort to replace.

2.22 Environmental tests

2.22.1 General

A sample of the control and indicating equipment shall be subjected to the following environmental tests made in accordance with BS EN 60068-2. To take account of the conditions to which the equipment may be subjected in practice, the procedures

specified in NZS 4512 differ in certain respects from the procedures specified in BS EN 60068-2. Where no specific information is given in NZS 4512, the methods indicated in the appropriate Parts of BS EN 60068-2 shall be followed.

2.22.2 Quiescent condition

The quiescent condition means that the control and indicating equipment is connected to its designated power supplies and all components such as lamps or switches are in the normal operating condition. All incoming and outgoing connections that are provided shall be connected to the appropriate equipment or dummy loads up to the maximum number or size specified by the manufacturer. Where alternative equipment is specified, that which imposes the greater load shall be used.

2.22.3 Preliminary test

In order to reduce the probability of a defective component failing during an environmental test and therefore being mistaken for a design error, the equipment shall be operated in its quiescent condition before starting the environmental test programme. At the end of a 20 h period of continuous operation in its quiescent condition, the equipment shall be subjected to the functional tests of 2.22.5. If, during a test of 2.22.5 the equipment functions incorrectly due to a defective component, any such component shall be replaced by one of the same type and manufacture, and the equipment shall be repeatedly operated in its quiescent condition and tested as above until it has completed 20 h of continuous operation followed by correct functioning during the tests of 2.22.5.

2.22.4 Preconditioning and recovery procedure

Before and after each environmental test, the temperature of the control and indicating equipment shall be allowed to stabilise in an environment having any combination of temperature, humidity, and pressure within the following limits:

Temperature	15°C – 25°C
Relative humidity	45% – 65%
Air pressure	860 mbar – 1060 mbar

The ambient temperature and humidity shall be substantially constant during preconditioning, during recovery, and while a functional test is carried out. Batteries used shall be allowed to become charged to their normal state.

2.22.5 Functional tests

These tests shall consist of the following operations made in the order in which they are listed:

(a) Operation of a detector, manual call point, or electrical equivalent, to ensure that the control and indicating equipment functions correctly;

(b) Operation of 'SILENCE ALARMS' switch to ensure correct functioning;

(c) In multi-zone control and indicating equipment, operation of another alarm circuit connected to a different zone from that in 2.22.5(a) to ensure that the equipment functions correctly;

(d) Operation of the switches that would isolate the remote receiving centre to ensure correct functioning;

(e) Operation of the reset controls to ensure correct functioning; and

(f) Removal of all energy supplies in order to ensure correct functioning of defect signalling (see 2.8.1(a), 2.11.6, and A3.5).

2.22.6 Inspection

At the conclusion of each environmental test, the control and indicating equipment shall be opened and inspected for damage consequential to that test.

2.22.7 Test procedure

For each environmental test specified in 2.22.8 the control and indicating equipment shall be subjected to the following tests in the order in which they are listed. At the beginning of each of 2.22.7(a) to (g), the control and indicating equipment shall be in its quiescent condition:

(a) Preconditioning procedure;

(b) Functional tests;

(c) Preconditioning procedure;

(d) The appropriate test environment of the severity, and for the duration, stated;

(e) Functional tests made at the end of the environmental test period while in the test environment;

(f) Recovery procedure;

(g) Functional tests; and

(h) Inspection.

2.22.8 Test environments

The control and indicating equipment shall be subject to the following tests in the order in which they are listed. The interval between each test shall not be more than 3 days:

(a) Dry heat as in BS EN 60068-2-2. The equipment shall be introduced into a chamber which shall be at the ambient temperature of the laboratory. The chamber shall then be adjusted to a temperature of 40°C ± 2°C with an absolute humidity not exceeding 20 g of water vapour per cubic metre of air (corresponding approximately to 30% relative humidity at 40°C). After temperature equilibrium in the chamber has been reached, the equipment shall be exposed to these conditions for 16 h continuously. While it is being adjusted the temperature in the chamber shall not change by more than 1°C per minute averaged over a period of not more than 5 min;

(b) Damp heat as in BS EN 60068-2-78. The equipment shall be introduced into a chamber which shall be maintained at a temperature of 40°C ± 2°C and a relative humidity of 93% ± 3%. The equipment shall be exposed to these conditions for 4 days continuously;

(c) Cold as in BS EN 60068-2-1. The equipment, while being at the ambient temperature of the laboratory, shall be introduced into the chamber, which shall also be at that temperature. The temperature within the chamber shall be adjusted to 0°C ± 2°C. While it is being adjusted, the temperature in the chamber shall not change by more than 1°C per minute averaged over a period of not more than 5 min. The equipment shall be exposed to the low temperature conditions for a period of 2 h

after temperature stability has been reached. The equipment shall remain in the chamber during the recovery period; and

(d) Vibration operational test as in BS EN 60068-2-6. The equipment, mounted on a vibration table in its normal operating position and by its normal fastenings, shall be subjected to horizontal vibrations of peak displacement amplitudes corresponding to a constant peak acceleration of 0.98 m/s^2 over the frequency range 5 Hz – 60 Hz. One sweep of the frequency range shall be made at a rate of approximately one octave per minute for each condition of the equipment in the functional tests described in 2.22.5.

2.22.9 Performance requirements

The equipment shall be considered satisfactory if:

(a) No maloperation occurs during the environmental test;

(b) The functional tests specified cause the equipment to respond correctly and no failures occur; and

(c) No damage which is a result of faulty design or construction is revealed.

2.22.10 Alternative environmental testing regime

As an alternative to the foregoing, the following environmental test regime may be applied, either in whole or in part:

(a) AS 7240.2 section 5.12 instead of 2.22.8(a);

(b) AS 7240.2 sections 5.5 and 5.10 instead of 2.22.8(b);

(c) AS 7240.2 section 5.4 instead of 2.22.8(c);

(d) AS 7240.2 sections 5.7, and 5.11 instead of 2.22.8(d).

2.23 Operational test

2.23.1 Test procedure

Starting with the control and indicating equipment in its quiescent condition, each zone shall be operated in succession. Zone circuits shall not be reset between each operation, but audible alarms shall be silenced between each operation.

2.23.2 Performance requirement

The performance of the equipment shall be considered satisfactory if the requirements specified in 2.4 are met.

2.24 Electromagnetic interference and compatibility

2.24.1 Radiated radio frequency interference (RFI)

The RFI noise voltages produced by the control and indicating equipment during the functional tests (see 2.22.5) shall be measured. The equipment shall be considered satisfactory provided that the results of the tests comply with the relevant statutory requirements.

2.24.2 Electromagnetic compatibility (EMC) – Immunity

The control and indicating equipment shall be demonstrated to comply with all the following EMC immunity requirements when tested in accordance with IEC 62599-2:

(a) Mains supply voltage variations;

(b) Mains supply voltage dips and short interruptions;

(c) Electrostatic discharge;

(d) Radiated electromagnetic fields;

(e) Conducted disturbances induced by electromagnetic fields;

(f) Fast transient bursts; and

(g) Slow high energy voltage surge.

2.25 Marking

2.25.1

Control and indicating equipment shall be clearly and permanently marked with the name of the manufacturer, the manufacturer's type identification, and the year of manufacture in addition to any markings specified by the relevant statutory requirements.

2.25.2

All indicators and manual controls shall be clearly labelled to indicate their functions.

2.25.3

The markings specified in 2.25.1 and the labelling of externally accessible indicators and manual controls shall meet the 'test of marking' durability requirements of AS/NZS 3100.

2.25.4

Components, sub-assemblies, connectors, fuses, and terminals shall be clearly and adequately identified.

2.26 Software-controlled equipment

2.26.1 Program monitoring

The correct execution of the software by any processor of a control unit shall be supervised by a monitoring (watchdog) circuit. This watchdog shall monitor execution of the main functions of the program and shall not be prevented from operation by the failure of a processor or its associated clock circuits.

NOTE – A watchdog facility integral with a processor is acceptable.

If correct execution is not successfully established, a defect warning shall be given within 60 s of the occurrence of the failure.

2.26.2 Storage of software

2.26.2.1 General

All software necessary for the functions required by this standard shall be held in solid-state memory. It shall not be possible to inadvertently override any mandatory requirement of this standard.

2.26.2.2 Operating firmware

The main operating software (firmware) of control and indicating equipment shall be held in non-volatile memory. The firmware shall be safeguarded and shall be modifiable only after access by lock, or code, or other means at a level additional to that specified in 2.15.1(f), and shall be:

(a) Changeable only after an on-site manual enabling action;

(b) Protected from corruption due to abnormal operation or program execution; and

(c) Preserved (by design) for a period of at least 10 years in the event of system power failure.

The appropriate hardware component shall be marked with a designation positively identifying its contents (such as program version) unless that information can be readily accessed via an alphanumeric display or portable device application program.

If a portable device application program is used to update the control and indicating equipment firmware this functionality shall be clearly differentiated from that used for site-specific configuration changes to the control and indicating equipment.

2.26.2.3 Site-specific configuration data

Site-specific data (configuration data) stored in the control and indicating equipment shall be held in non-volatile memory. The configuration data shall be safeguarded and shall be modifiable only after access by lock, or code, or other means at a level additional to that specified in 2.15.1(f), and shall be:

(a) Changeable only after an on-site manual enabling action;

(b) Protected from corruption due to abnormal operation or program execution;

(c) Able to be clearly and unambiguously checked against hard-copy documentation to reveal any undocumented or unauthorised alteration; and

(d) Preserved (by design) for a period of at least 10 years in the event of system power failure.

Configuration data shall be able to be readily accessed via an alphanumeric display or a portable device application program.

Run-time data may be stored in volatile memory.

2.26.3 Networked systems

For systems with networked (multiple interconnected) control and indicating units the updating of firmware, or configuration data, or both may be carried out from one point on the network provided the changes can be made only after an on-site manual enabling action.

2.26.4 Start-up

The equipment shall restart in a safe, operational, and predictable manner after a failure of the power supply.

2.26.5 Data integrity

All control and indicating equipment firmware and configuration data shall be checked automatically (for example, by 'checksum' procedure) at intervals not exceeding 72 h. A defect warning shall be given in the event of failure of these data checks.

3 SINGLE-ZONE FIRE ALARM SYSTEMS

NOTE – The equipment design requirements for multi-zone fire alarm systems are set out in section 2.

3.1 Function

The intended function of any particular single-zone fire alarm system shall be that declared by the owner in accordance with 1.6.

3.2 Limitation

A single-zone fire alarm system shall not be used to protect more than a single zone.

3.3 Exceptions

Single-zone fire alarm systems shall comply with all relevant requirements of sections 1, 2, 4, 5, 6, and 8 of this standard except for the following:

(a) Zone division and indication as per 2.2 and 2.4.1(b) is not required;

(b) Unless a declared functional requirement, initiation of a fire alarm signal to a remote receiving centre as per 2.4.1(c) and 2.4.12 is not required – in which case:

  (i) Isolation facilities as per 2.9 are not required, and

  (ii) Functional tests of 2.22.5(d) and (f) are not applicable;

(c) The internal silencing switch required by 2.5.2 and 2.5.3 need not be provided; and

(d) A zone index and indicating unit as defined by 4.2.9 and 4.3.1 are not required.

4 INSTALLATION

4.1 Zones and sectors

4.1.1 Sector

A sector shall be confined to a single building and shall cover no more than 11 000 m² in floor area (not including ceiling space). This may be extended to 22 000 m² in floor area where areas no greater than 5500 m² can be separately isolated (for example, using the zone or point isolation facilities of the control equipment).

Where two or more buildings are contained on one site, and are intended to be managed as one building with a common use and set of ownership arrangements, common access, and a single fire brigade attendance point, they may be covered by one control unit if the combined floor area is not greater than a total of 5500 m². Each building shall not be greater than three storeys, and the travel distance to the farthest entrance shall not be greater than 100 m from the common fire brigade attendance point unless specifically approved by the fire brigade.

The fire brigade shall be consulted at an early stage in the design of any multi-building system to facilitate the approval of the proposed arrangement.

NOTE – The fire brigade might require flashing lights outside the building that is in alarm if the buildings are hard to define or locate on the complex.

4.1.2 Detection zones

4.1.2.1

Every part of each floor of the building shall be designated as part of a discrete detection zone except:

(a) An area of the top floor and the next floor down may form part of one zone provided that the only access to the highest area is from the floor immediately below. Ceiling spaces in such areas may be included in the zone; or

(b) Firecells containing more than one level may be regarded as a single zone, provided escape routes are not shared with other firecells. Ceiling spaces in such firecells may be included in the zone.

4.1.2.2

Every ceiling or roof space in the building required to have more than four point-type detectors shall be designated as one or more unique detection zones except where the ceiling forming the space comprises not less than 75% removable tiles. In this case, the space may form part of the corresponding zone of the floor below.

NOTE – 4.1.2.1(a) allows the top two floors and their ceiling spaces to be designated as one zone.

4.1.2.3

Ceilings comprising not less than 75% removable tiles do not add to the zone area when included in the zone of the floor below.

4.1.2.4

The maximum area per detection zone shall be 1000 m^2 except where:

(a) Unique detector and call point identification (for example, alphanumeric display per 2.10.7) is readily accessible by the fire brigade at the fire brigade attendance point, in which case the zone area may be extended to 2000 m^2; or

(b) There is a Type 6 system in place where the manual call point zone area may be extended to 2000 m^2.

NOTE – For the purposes of zoning, sprinkler heads installed as part of a Type 6 or Type 7 system are not considered as being used as thermal fire detectors.

4.1.2.5

Every household unit shall be a separate zone or zones, except where 4.1.2.4(a) applies.

Separate buildings shall have separate zones, whether or not they are linked by covered walkways.

4.1.3

In buildings of more than one floor level, the delineation of the zones on all floors shall be similar as far as possible with the usage and construction of the building.

4.1.4

The area defined by a detection zone is the nominated search area which is normally accessible from within the zone. Attached areas with external access only may also be included in the zone provided that they are not additional to the search area limit.

4.1.5

Each zone shall be designated so that the origin of the fire alarm activation can be readily and accurately located.

NOTE – Detectors and manual call points in multi-level areas (such as stairwells) should designate in the zone of the level on which they are located.

4.1.6

Where several control units are installed within the same firecell all alerting devices shall be operated simultaneously.

4.1.7 Supplementary fire alarm system

In addition to the building being protected throughout by a fire alarm system that fully complies with this standard, a supplementary fire alarm system may be installed to cover a specific risk and be connected to a separate zone on the control unit. In such instances, the zone area and boundary requirements of 4.1.2.4 may be relaxed for the supplementary system provided the location and extent of the supplementary fire alarm system is readily identifiable on the zone index. The supplementary fire alarm system shall comply with all other requirements of this standard. (See also Appendix D.)

Supplementary fire alarm systems may signal to a remote receiving centre via the fire alarm system.

A restaurant suppression system that complies with UL 300 may also be connected to a separate zone on the control unit in this way.

Detectors connected to a security system do not comply with these requirements.

4.2 Installation practice

4.2.1

Cable used within a building for detector circuits, alerting device or loudspeaker circuits, or ancillary control circuits shall generally comply with either AS/NZS 5000.2 or AS/NZS 5000.3 and shall either be sheathed in polyvinyl chloride or installed in conduit. Conductors may be stranded or solid core and of any cross-sectional area, except that conductors less than 1.0 mm² shall be stranded. Two-core cables shall have a minimum cross-sectional area of 0.75 mm² for each conductor. Cables having more than two cores shall have a minimum cross-sectional area of 0.5 mm² for each conductor. Cable used external to a building (overhead, underground in conduit, direct buried) or in areas of sustained sub-zero temperature shall be of an appropriate alternative type.

Attention is drawn to the need for all wiring associated with the fire alarm system to comply with the requirements of the Electricity (Safety) Regulations for 230 volt systems and for all penetrations through fire or smoke separating elements to be adequately sealed to maintain the fire resistance rating of the element or the integrity of the smoke separation (see also 1.9).

4.2.2

Cable installation shall be in accordance with all of the following requirements:

(a) All outgoing and return conducting paths of any one circuit shall be connected into each detector and manual call point of that circuit;

(b) Cables shall be protected against damage where installed on the surface and within 2 m of floor level, passing through walls, or in such other positions where they are likely to be damaged;

(c) Outgoing and return conducting paths of alerting devices, including loudspeakers (which are required by 2.8.1(f) to be monitored), shall terminate on, or within each alerting device;

(d) Cables shall be installed in conduit where it is necessary to bury the cables in concrete or plaster;

(e) Cables shall be through-jointed only in suitable enclosed terminal boxes accessible for inspection and maintenance purposes;

(f) A separate sub-circuit connected to the mains electrical supply at a main switchboard or distribution board shall be used solely for the fire alarm supply including any alarm transmission device. The circuit, circuit breaker, or fuse shall be clearly identified by a label, attached to the distribution board, marked in a permanent manner with the words ‘FIRE ALARM’. The fire alarm sub-circuit shall be directly connected to terminals provided for the purpose;

NOTE –

(1) AS/NZS 3000 has specific requirements for electrical supplies to safety services.

(2) Termination at the main distribution board is preferable, especially where sub-main distribution boards serve separately tenanted areas.

(g) Conductor cross-sectional areas shall be such that the voltage available at equipment shall be within the equipment rating;

(h) Cables installed overhead between buildings shall be suitably protected from environmental conditions, adequately supported and relieved from stress;

(i) All zone circuit wiring external to the control unit shall be isolated from the building earth. Earth return circuits are not acceptable. Conduit or other metal sheathing of conductors shall not be used as any part of an electrical fire alarm circuit;

(j) The insulation resistance between individual conductors and between each conductor and earth shall be greater than 5 MΩ;

(k) All wiring external to the control unit shall be separate and distinct (normally red sheathed) and electrically separate from any other circuit;

(l) Crimp pin terminals or ferrules shall be fitted to:

(i) End of line devices, and

(ii) Stranded cables of zone, alerting device, loudspeaker, and addressable loop circuits terminating at control units, and

(iii) Any other connections likely to be removed during annual checks and tests or other routine servicing;

(m) Notwithstanding the other requirements of this standard, optical fibres are permitted provided that the integrity of the installation is equivalent to the requirements of this standard and such circuits are dedicated to the fire protection functions of a building;

(n) Unless duplicated as per 4.2.2(r), the cabling of transmission circuits from a control unit to the telecommunications demarcation point for a fire alarm system connected to a remote receiving centre shall be run in fire-rated cable. The cable shall have a minimum 15 min integrity rating and shall comply with AS/NZS 3013 Classification WS11. Alternatively, the cable may be run in a fire-rated conduit or a fire-rated duct used solely for cabling and non-combustible services. The conduit, duct, or wall cavity shall have minimum fire resistance rating of 15 min (FRR-/15/-). If the demarcation point is external to the building, that part of the cable run external to the building is not required to have a fire resistance rating;

(o) A wiring fault (such as an open or short circuit) shall not initiate a fire signal;

(p) A single wiring fault (such as an open or short circuit) shall not result in a loss of coverage of more than one zone as defined by this standard;

(q) A single wiring fault (such as an open or short circuit) shall not result in a loss of alerting device coverage of more than 2000 m^2;

(r) Where duplicated path or loop wiring is used to achieve the performance requirements of this standard, this wiring shall be run diverse as follows:

(i) Separating cable runs by a minimum of 300 mm in all directions on leaving the terminating point, installing cables in different conduit, via different cable routes, on different cable trays, in different risers (where available), or via different firecells as soon as practicable thereafter; or

(ii) Where cable runs are unable to be separated in any of these ways then one leg shall be fire rated with a minimum 15 min integrity rating and shall comply with AS/NZS 3013 Classification WS11. Alternatively, that leg of the cable may be run in a fire-rated conduit or a fire-rated duct used solely for cabling and non-combustible services. The conduit, duct, or wall cavity shall have minimum fire resistance rating of 15 min (FRR-/15/-);

NOTE – While not mandated by this standard, fire rating of cables can be required by other standards (for example, where they may convey fire fan control signals).

(s) Notwithstanding the other requirements of this standard, cables of other specifications (for example 'CAT 5') and less than 0.5 mm^2 in cross-sectional area are permitted for dedicated supervised data communications links such as remote signalling, networking between control units, or between control units and indicating equipment;

(t) In staged evacuation systems (see 4.6.12), where the path of loudspeaker or alerting device cabling traverses another firecell or evacuation zone, such cabling, including joints and terminations, shall have a minimum fire resistance rating of AS/NZS 3013 classification WS51W. Cabling within the firecell or evacuation zone it serves is not required to be fire-rated;

(u) Fire-rated or duplicated cabling is not required between equipment cabinets that abut, unless such cabling is run outside the cabinet; and

(v) Cables carrying power, data, or audio signals should be shielded, twisted, or physically separated so that interference between cables or from other sources does not impair the system's performance.

4.2.3

The fire alarm system shall be separate and distinct from all other building services and shall not share equipment with other services (for example, intruder alarm systems, fibre optic modems, IP routers, IP switches, or IT servers) in the provision of any mandatory function.

4.2.4

Earthing and bonding of the installation shall be in accordance with the relevant statutory requirements.

4.2.5

Ancillary services as described in 2.3.2 shall be connected through isolating devices as described in 2.3.3. The connection of this additional apparatus shall not adversely affect or prejudice the performance of the fire alarm system. Voltages in excess of 32 VAC and 50 VDC associated with remote control functions shall not enter the control unit or the enclosure of any ancillary control device connected to the control unit.

Ancillary services interfaces (for example, gas shut-off) shall be configured to operate in a safe and predictable manner, both on fire alarm system activation and restoration.

4.2.6

The mounting shall be such that the control and indicating units are securely fixed in place and are not subjected to undue vibration or shock.

4.2.7

Fire alarm and defect warning indicators shall be labelled in accordance with 2.10.5 and 2.10.6.

4.2.8

Where an audible defect warning device is required (see 2.8.2), this shall be located so as to be audible in a normally occupied part of the building. The audible warning device shall be labelled 'FIRE ALARM FAULT – CONTACT SERVICE COMPANY'.

4.2.9 Zone index

4.2.9.1

The location of the zones relative to the usual viewing position of the indicating unit shall be clearly defined by means of a robust and permanently marked index on the outside face of the unit.

4.2.9.2

The index shall include a diagram, complying with Appendix H, which is correctly oriented relative to the viewing position, on which shall be shown all of the following:

(a) The outline of the building or buildings by means of a solid line. The location of any stairways shall also be shown;

(b) The main fire brigade access into the premises and other entry points, by means of triangles oriented to indicate direction of entry (see Table H1). External stairs providing access to the building shall be shown;

(c) The location and approximate divisions between zones by means of a solid line where there is no access and a broken line where there is access;

(d) The location, extent, and type of any other systems connected to the alarm system (see 4.1.7 and 4.6.13);

(e) The location of the indicating unit, using the symbol of Table H1, and the words 'YOU ARE HERE';

(f) The location of any other indicating units;

(g) The location of any alphanumeric displays intended for fire brigade use;

(h) The type of detector installed in the building prominently displayed, for example smoke, heat, manual. Zones protected by line-type heat detectors shall also be identified;

(i) For a fire brigade connected system, the system's identifying number permanently and durably affixed to a bottom corner of the front and back of the indicating unit;

(j) Zone descriptors that are either the name of the area or a logical sequence of alphanumeric characters, preferably arranged in a vertical configuration;

(k) Unprotected significant areas;

(l) Mezzanine levels and associated stair access;

(m) The location of internal stairs, lift shafts, ramps within the building;

(n) The location of the main electrical switchboard;

(o) The location of any key shut-off devices (for example gas, fuel, solar, battery);

(p) If the smoke detection component of a Type 5 is used, or smoke detectors do not call the fire brigade, and optional indication on the zone index is provided (see 2.4.1), such indication shall be separate and shall be labelled 'NOT CONNECTED TO FIRE BRIGADE';

(q) A side elevation if a building has five or more levels or has unusual access. Levels of similar layout may have a single common diagram if accompanied with an appropriate legend;

(r) The location of any fire sprinkler inlet, sprinkler control valves, and fire hydrant inlets and outlets; and

(s) Any other information that the fire brigade may reasonably require.

Index lettering shall be 4.0 mm minimum height, upper case Arial font and arranged horizontally.

The index background colour shall be white.

The diagram need not be exactly to scale, or include every building detail, however the relative sizes of zones shall be maintained.

The diagram shall be approved by the fire brigade.

Service or installation company branding or names shall not be placed on the zone index.

4.2.9.3

A diagram is not required in the following circumstances:

(a) In a single building containing only one zone and in multistorey buildings where the floor plan contains only one zone per floor, and the floor plan throughout the building is similar; and

(b) Where the ingress to the building, all floors, and any special requirements are clearly apparent.

4.2.9.4

Where manual call points or heat or smoke detectors are in a common zone, separate indicators may be used but should be positioned together on the zone index.

4.2.10

Detectors and manual call points shall be connected in such a way that a defect warning is given in the event of the removal of any such devices from a circuit.

4.2.11

Terminals of electrical detectors shall be covered when installed.

4.2.12

Zone circuits shall be allocated an identifying symbol. Every detector, sampling point, manual call point, alerting device, loudspeaker, remote cabinet, junction box, and end of line device shall be uniquely marked in a permanent and durable manner in characters not less than 5.0 mm high with its zone symbol and a designation indicating either its

logical system address (such as corresponds with a system's alphanumeric display) or the numerical order in circuit beginning at the control unit. All this marking shall be visible when the components are installed. Remote cabinets shall also be marked 'FIRE ALARM'.

4.2.13

All external cable circuits terminating at control units, indicating units, or remote cabinets shall be marked with a unique permanent label identifying their function. Multicore cables shall be uniquely identified at each end with each pair identified as to its function and each conductor's polarity, as applicable. This marking shall be visible when the control unit, indicating unit, or remote cabinet is open. Multicore cable ends shall be entirely contained within a control unit, indicating unit, or a remote cabinet.

NOTE – This requirement includes but is not limited to cables of zone, alerting device, loudspeaker, addressable loop, network, indicating unit, transmission, ancillary interface, and power supply circuits.

4.2.14

All relays controlling ancillary services shall be identified with a permanent label clearly and unambiguously identifying their function. This may be combined with the labelling of associated cabling per 4.2.13.

4.2.15

Where detectors or sampling points are mounted on movable tiles, adequate cable or tubing shall be left to allow for movement of tiles.

4.2.16

Detector cable or sampling point ceiling penetration holes shall be as small as practicable and shall be sealed where there is a likelihood of either a differential airflow or an insect infestation from a ceiling or roof void via the penetration.

4.2.17

The manufacturer's finish on the surface of the sensing element of a detector shall not be painted or coated over.

4.2.18

In occupancies or situations likely to be subject to vandalism, interference, or damage:

(a) Alerting devices and detectors shall be protected by a suitable guard; and

(b) Any exposed alerting device cabling shall be suitably protected.

4.2.19

Detectors, located in high roofs and other places that are difficult to access, shall be installed so as to be accessible for maintenance and replacement.

NOTE – AS/NZS 3000 has requirements for the accessibility of electrical equipment.

4.2.20

Where exposed to the weather, moisture, corrosive environments, or in locations subject to regular washing down, the detection system shall be resistant to false actuation due to corrosion or the entry of water, and equipment shall be appropriately IP rated.

Fixtures and fittings used in such environments shall be corrosion resistant.

4.2.21

In locations vermin are likely to frequent, equipment shall be installed so as to resist entry or damage by vermin.

4.2.22 Seismic performance

4.2.22.1

Fire alarm systems shall be installed so as to retain structural and operational integrity under the seismic actions and at the relevant limit states specified in NZS 1170.5.

NOTE –

(1) Based on NZS 1170.5 (including Amendment 1) fire alarm system components are required to be classified into category P.5 at minimum (structural and operational integrity at Serviceability Limit State 2). In addition, where some components are beyond the NZS 1170.5 section 8 weight and height thresholds those components are required to also be classified into category P.1/P.2/P.3 (structural integrity at the Ultimate Limit State). When some components are classified into one or more categories, the verification of performance for all of categories needs to be considered.

(2) In the absence of NZS 1170.5 weight/height thresholds specific to linear systems, such components (cable, conduit, and cable trays) that weigh less than 3 kg/m and could fall less than 3 m may be classified into category P.5.

(3) NZS 4219 provides guidance on seismic performance of engineering systems in buildings, including a simpler but likely more conservative method to determine seismic actions that should meet or marginally exceed those determined by NZS 1170.5.

4.2.22.2

The attachment to the supporting structure of fire alarm control and indicating units, power supplies, and EWIS systems shall resist the seismic loads specified in NZS 1170.5.

4.2.22.3

Batteries shall be strapped or otherwise adequately restrained within their cabinets or enclosures to prevent damage or failure in accordance with NZS 1170.5 or NZS 4219.

4.2.22.4

Cables, conduit, and cable trays crossing a structural separation shall be provided sufficient flexibility to accommodate the design horizontal and vertical seismic movement.

NOTE – The design horizontal and vertical displacement should be available from the building's structural engineer. If this information is not available, NZS 4219 clauses 3.5 and 5.8.3 provide methods to estimate horizontal inter-storey and structural separation seismic movements respectively. These values might be conservative.

Cables shall not be run through concrete tilt panel construction joints or share penetrations with piped services.

4.2.22.5

Cable trays suspended more than 400 mm below their structural support shall be restrained against the seismic forces determined in NZS 1170.5.

NOTE – NZS 4219 requires separation between braced and unbraced services, with a greater separation for unbraced services.

4.3 Equipment location

4.3.1 Indicating unit location

4.3.1.1

Indicating units shall be located to suit the fire brigade access requirements. On occasion this may override some aspects of 4.3.1.2.

Fire brigade approval is required.

4.3.1.2

Indicating units shall be located as follows:

(a) With the zone index and all indications and controls intended for fire brigade use completely contained within the limits of 750 mm and 1850 mm from floor or ground level (as applicable);

(b) With the zone index located as high as practicable within the limits specified in 4.3.1.2(a);

(c) With only clear annealed glass acceptable in front of the indicating unit. No internal fittings (such as blinds, curtains) or external objects (such as signs, vegetation, sprinkler inlets) that might hinder visibility or prevent close access are permitted in front of the indicating unit;

(d) Clearly visible from the normal viewing position;

NOTE – To assist firefighting personnel, the normal viewing position is usually external to the building (see also 4.6.10).

(e) To minimise the effects of direct sunlight (see 2.10.6);

(f) With a minimum unobstructed clearance depth of 1000 mm at the access doors for maintenance purposes;

(g) To provide easy access to all control facilities; and

(h) To preclude malicious damage wherever practicable.

At least one evacuation switch (see 2.7), one external silencing switch (see 2.5), plus any other firefighters' emergency services controls shall be provided at the main indicating unit (as agreed or approved by the fire brigade). These controls may also be provided at other indicating or control units or both.

NOTE – In special circumstances these controls can be required at other locations such as building management positions or the building's fire control room(s). Consultation with the fire brigade should be sought.

4.3.2 Control unit location

Control units not incorporating an indicating unit shall be located as follows:

(a) To suit the fire brigade access requirements, if including switches or other controls intended for firefighter use – fire brigade approval is required;

(b) Contained within the limits of 700 mm and 2300 mm from floor level, and with all indications and controls intended for fire brigade use contained within the limits of 750 mm and 1850 mm from floor or ground level (as applicable);

(c) With a minimum unobstructed clearance depth of 1000 mm at the access doors for maintenance purposes;

(d) To provide easy access to all control facilities;

(e) To preclude malicious damage wherever practicable; and

(f) Within a firecell protected by a manual or an automatic fire alarm system, or a fire sprinkler system, unless the control unit is situated on the exterior of the building.

Control units shall not penetrate a fire separation.

4.3.3

Indicating and control units shall be located so that they can be safely serviced at any time with the interior of the unit, the technician, and their tools and equipment protected from adverse weather conditions and hazards (for example, vehicular traffic).

In selecting a method of installation, consideration shall be given to the direction of prevailing winds, local minimum temperatures, the likelihood of heavy rainfall, the proximity of vehicle entrances, and so on.

Indicating and control units should not be mounted externally to the building, or serviced by opening an external window or door, if any of the following local conditions apply:

(a) Outdoor temperature regularly falls below 0°C; or

(b) The unit or service technician will be exposed to rainfall.

Where external service access is unavoidable and a dedicated canopy is used to achieve weather protection for servicing, the following minimum canopy dimensions are recommended:

(c) Sides – extending at least 1200 mm out from either side of the unit;

(d) Front – extending at least 2 m beyond the unit's outer face;

(e) Height – centred above the unit between 2 m and 3 m from ground level.

NOTE – A verandah or loading dock canopy may provide adequate weather protection, despite being higher than recommended in 4.3.3(e).

4.3.4

Battery chargers, power supplies, batteries, and the mains power supply switch shall be housed in a cabinet or cabinets constructed in accordance with 2.15.1(a) to (f). Adequate ventilation and protection from the corrosive effects of electrolytes shall be provided.

4.3.5

Alphanumeric displays used to provide supplementary information for the fire brigade may be located in a readily accessible position within the building. Their location shall be marked on the index (see 4.2.9.2(g)).

4.3.6

End of line devices, addressable termination modules, junction boxes, and the like, which require physical access to perform annual tests shall be installed in a readily accessible location and contained within the limits of 750 mm and 1850 mm from floor level.

4.4 Manual call point locations

4.4.1

Manual call points shall be located as follows:

(a) As close as practicable to every designated exit door, except as permitted in 4.4.1(d);

(b) Such that they are clearly visible when travelling in the direction of escape;

(c) Adjacent to any emergency door override where fitted and complying with 4.4.1(a);

(d) Where there are multiple exit doors along a single wall, one common manual call point may be used provided not more than a 5.0 m travel path deviation is required to reach the manual call point from each door and 4.4.1(b) can be satisfied;

(e) At the entrance to any vertical safe path leading out of the building, this may be beside the final door leading to the vertical safe path or directly adjacent to the stairs within the vertical safe path (see Figure 1);

(f) On each full-floor landing in multistorey buildings except where a firecell has its own stair exiting the building in which case the manual call point may be located at the final exit provided the zone includes the stair and all other requirements of 4.4.1 are met;

(g) In other locations as necessary to ensure that the travel distance to the nearest manual call point is not more than:

(i) 30 m for manual only systems

(ii) 45 m for full coverage detector or sprinkler systems; and

(h) In large open structures, such as warehouses and distribution centres, where there are no parts of the building structure on which to mount additional manual call points to comply with 4.4.1(g), the additional manual call points should be located on pillars, exterior walls, and in staffed areas so as to comply with 4.4.1(g) as near as reasonably practicable.

NOTE –

(1) Manual call points are not required at every exit. Knowledge of the building's designated exit doors will help determine which exits require them.

(2) A stair from a small mezzanine does not require a manual call point if the travel distances of 4.4.1(g) are not exceeded when exiting the mezzanine and it is included in the same detection zone.

(3) Manual call points should be located such that they can be operated safely.

4.4.2

Each manual call point shall be at all times clearly visible, readily accessible, and positively identifiable. It shall be securely mounted with its centre at a height of 1200 mm to 1500 mm above floor level and a clear space of at least 600 mm shall be preserved in all directions.

4.4.3

Where the occupancy of the premises can result in repetitive malicious fire alarms, the manual call points may be located where they are under the direct control of supervisory staff or apartment occupants.

4.4.4

In occupancies with 24 h staffing, such as care and detention facilities, additional manual call points should be located at or adjacent to the main staff areas such as control rooms and nurses' stations.

4.4.5

Manual call points may be located in yard areas between buildings or on isolated structures provided that the cabling is run in such a manner as to be protected against damage. Where the system is connected to the fire brigade and the site is at times unattended such manual call points shall be permitted only if the site is secured against unauthorised access or the fire brigade agrees to each location.

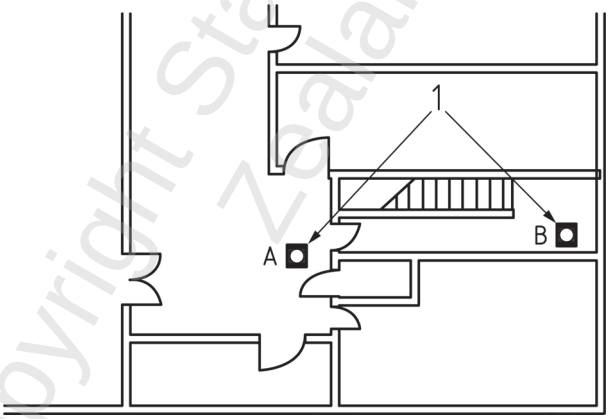


Figure 1 – Manual call point location at entrances to vertical safe path per 4.4.1(e)
(reproduced from BS 5839-1 by kind permision of BSI)

4.5 Detector selection, location, position, coverage, and spacing

4.5.1 Detector selection

4.5.1.1

The firecell shall be covered by listed detectors that, in particular, respond to the normal phenomena arising at an early stage in a fire. However, the selected detector shall not respond to ambient and environmental conditions typical of the location. Specialised detectors responding to phenomena other than heat or smoke should be used with caution and shall only be used in addition to a comprehensive heat or smoke detector

coverage. Detector selection shall be consistent with the detector manufacturer's instructions (see also Appendix J).

NOTE – In the interests of reliability and serviceability, analogue addressable detection is recommended for systems with more than 35 devices or 3 zones.

4.5.1.2

The temperature rating of heat detectors shall be at least 15°C above the highest normally expected temperature.

NOTE –

(1) In areas where the ambient temperatures are higher than normal, heat detectors should be selected to respond at 40°C to 50°C above the expected average ambient temperature.

(2) Heat detectors that conform to Appendix E are colour coded according to E8.2.

4.5.1.3

To reduce unwanted alarm activations, smoke detectors may be replaced by heat detectors (or sprinklers – see 4.5.4.1(h)) in any or all of the following areas:

(a) At the top of stairways, hoists and lift wells, service ducts, chutes, above rope or belt openings, and in skylights;

(b) Under loading-dock canopies, over occupiable covered balconies, and under external building appendages;

(c) In built-in storage enclosures (such as cupboards and wardrobes), including cleaners' cupboards and understair cupboards;

(d) Within 5.0 m horizontally of any fixed cooking apparatus;

(e) Within bathrooms or other wet areas where steam is likely to be generated in sufficient quantity to be the cause of false alarms;

(f) In toilet spaces; and

(g) In roof or ceiling spaces with difficult access for cleaning detectors.

In addition to (a) to (g) above, in any other area where the activity occurring in that area is likely to be the cause of unwanted smoke detector alarms, smoke detectors may be replaced by heat detectors (or sprinklers) up to a maximum of 25% of the remaining area of the zone.

See Appendix J for further information.

NOTE –

(1) If substituting heat detectors (or sprinklers) for smoke detectors, there are differing requirements for spacing (see 4.5.5.1).

(2) Enclosed ceiling or roof spaces, spaces external to the building, and any spaces not required by the declared functional requirements (see 1.6) to have smoke detectors do not count towards the zone area for the purposes of this clause.

4.5.1.4

Substitution of smoke detectors per 4.5.1.3 is prohibited in all the following areas:

(a) Spaces used for sleeping;

(b) Corridors used for escape from sleeping spaces;

(c) Corridors used for escape from places of crowd activity; and

(d) Any exitways internal to the building.

NOTE – A wardrobe or similar built-in storage enclosure or room adjacent to or opening into a sleeping space is not considered to be a sleeping space. It may, however, be part of a corridor used for escape from a sleeping space therefore requiring smoke detectors.

4.5.2 Detector location

Detectors shall be installed in locations as follows:

(a) All areas of the building, including rooms, halls, corridors, storage areas, basements, other subdivisions, and accessible and concealed spaces, unless exempted by 4.5.4.1;

(b) Each subdivision where a space is subdivided by walls, partitions, or storage racks reaching within 300 mm of the ceiling, except shower and toilet cubicles which comply with the requirements of 4.5.4.1(e);

(c) At the top of stairways, hoists and lift wells, service ducts, chutes, above rope or belt openings, and skylights if used for ventilation or if having a volume greater than 3 m^3;

(d) On the floor landings of all stairways;

(e) Within 1500 mm of a fire door where detection is not provided on both sides of the door;

(f) Under fixed decks, ventilation ducts, mezzanine floors, landings, floating ceiling panels, and the like, which are more than 1500 mm for heat detection or 2500 mm for smoke detection in both plan dimensions;

(g) Under loading-dock canopies and over occupiable covered balconies, provided in each case there is no dimension less than 1500 mm;

(h) Under other external appendages (such as verandahs) where combustible material is likely to be stored or a vehicle can be parked and where there is no dimension less than 1500 mm;

NOTE – Openable ceilings or roofs also require detectors. No special measures are required to compensate for a delay in detection when the roof or ceiling louvres are open.

(i) Under ducted hoods over cooking apparatus, with any dimension greater than 1500 mm, located adjacent to the extract point(s);

(j) All built-in cleaners' cupboards and built-in understair storage enclosures (see also Figure 2);

(k) All built-in enclosures containing a clothes dryer (see also Figure 2);

(l) All built-in enclosures containing a water heating appliance rated at more than 5 kW (see also Figure 2);

(m) All built-in storage enclosures opening into a sleeping space that have a capacity exceeding 6 m^3, and those with a capacity between 1.5 m^3 and 6 m^3 unless the latter are vented at the top into the room by an orifice greater than 0.02 m^2 (200 cm^2) (see also Figure 2);

(n) All built-in enclosures that have a capacity exceeding 1.5 m^3 and contain electrical switchboards, distribution boards, or in which mains-powered electrical or gas-fired appliances are used in situ (see also Figure 2); and

(o) All other built-in storage enclosures that have a capacity exceeding 6 m^3 and those with a capacity between 3 m^3 and 6 m^3 unless the latter are vented at the top into the room by an orifice greater than 0.02 m^2 (200 cm^2) (see also Figure 2).

NOTE – The location requirement given for detectors in 4.5.2(j) to (o) might occasionally be greater than recommended by the Acceptable Solutions for the New Zealand Building Code for such spaces. The cost consequence of full compliance with this standard is minimal on the few occasions when these spaces are larger than already exempted by this standard.

4.5.3 Detector position

Detectors shall be installed in positions as follows:

(a) Within 500 mm horizontally from the apex of a roof or ceiling;

NOTE – A roof or ceiling with a slope of less than 6° (1 in 10) may be deemed to be flat (see 4.5.5.8).

(b) Not less than 1.0 m from air delivery points of air conditioning plant or ducting;

(c) Not less than 200 mm from a wall;

(d) Where solid open joists, beams, purlins, girders, trusses, or the like are surmounted by roofs, floors, or ceilings, in sufficient quantities to meet the following minimum requirements (see also Figure 3):

(i) Supports for beams or joists that run at angles to other beams or joists may be ignored if the tops of the supports are spaced 100 mm or more from the ceiling

(ii) Where the beam or joist depth is less than 100 mm, detectors may be mounted either on the ceiling or on the bottom of the beams or joists, and the spacing requirements of 4.5.5 shall apply

(iii) Where beams or joists of depth 100 mm or more are spaced at centre-to-centre or centre-to-wall intervals of 900 mm or less, detectors shall be mounted on the bottom of the beams or joists and the spacing of detectors in the direction perpendicular to the beams or joists shall be two-thirds of the requirements of 4.5.5

(iv) Where the beam or joist depth is greater than 460 mm and the beams or joists are spaced at intervals exceeding 2400 mm centre-to-centre or centre-to-wall, each beam or joist shall be treated as a wall and the spacing requirements of 4.5.5 shall apply

(v) Where the beam or joist depth is less than 300 mm, and the beams or joists are spaced at centre-to-centre or centre-to-wall intervals of 2400 mm or less, but more than 900 mm, spacing of detectors in the direction perpendicular to the beams or joists shall be two-thirds of the requirements of 4.5.5. Detectors may either be mounted on the bottom of the beams or joists or on the ceiling (unless 4.5.5.1(a) applies)

(vi) In all other cases, detectors shall be mounted on the ceiling and the spacing of the detectors in the direction perpendicular to the beams or joists shall be two-thirds of the requirements of 4.5.5 to the first row of detectors in each inter-beam space

(vii) Two-third spacing is not required for line-type heat detectors and beam-type smoke detectors where the line or smoke beam is run perpendicular to the beams or joists

(viii) Where the beams or joists are at angles to each other (cross-hatched), the two-thirds spacing requirements of 4.5.3(d)(iii), (d)(v), and (d)(vi) shall be applied in both perpendicular directions

(ix) In concealed spaces, the requirements of 4.5.3(d)(i) to (d)(vii) shall apply except for concealed spaces less than 2000 mm high where the two-thirds spacing requirements of 4.5.3(d)(iii), (d)(v), and (d)(vi) may be ignored, and

(x) In all cases where detectors are mounted on the ceiling, they shall be stagger-spaced to evenly cover all inter-beam and inter-joist spaces as much as possible without resorting to additional detectors;

NOTE – The general principle of 4.5.3(d) is that each beam-to-beam or beam-to-wall space is first assessed separately, and then the requirements are applied on a best-fit basis to aggregations of similarly treated adjacent areas. Where beams or other protrusions are treated as walls, 4.5.5.1(d) is applied twice – once to each beam-to-beam or beam-to-wall space, and secondly to the room as a whole.

(e) The distance the sensing element is below the roof or ceiling underface, or beam or joist underface where detectors are mounted on the bottom of the beam or joist, is:

(i) In areas with up to 10 m ceiling height:

(A) For point-type and line-type heat detectors, not less than 25 mm and not greater than 100 mm

(B) For point-type smoke detectors, not less than 25 mm and not greater than 250 mm

(C) For beam-type smoke detectors, not less than 300 mm and not greater than 600 mm, and

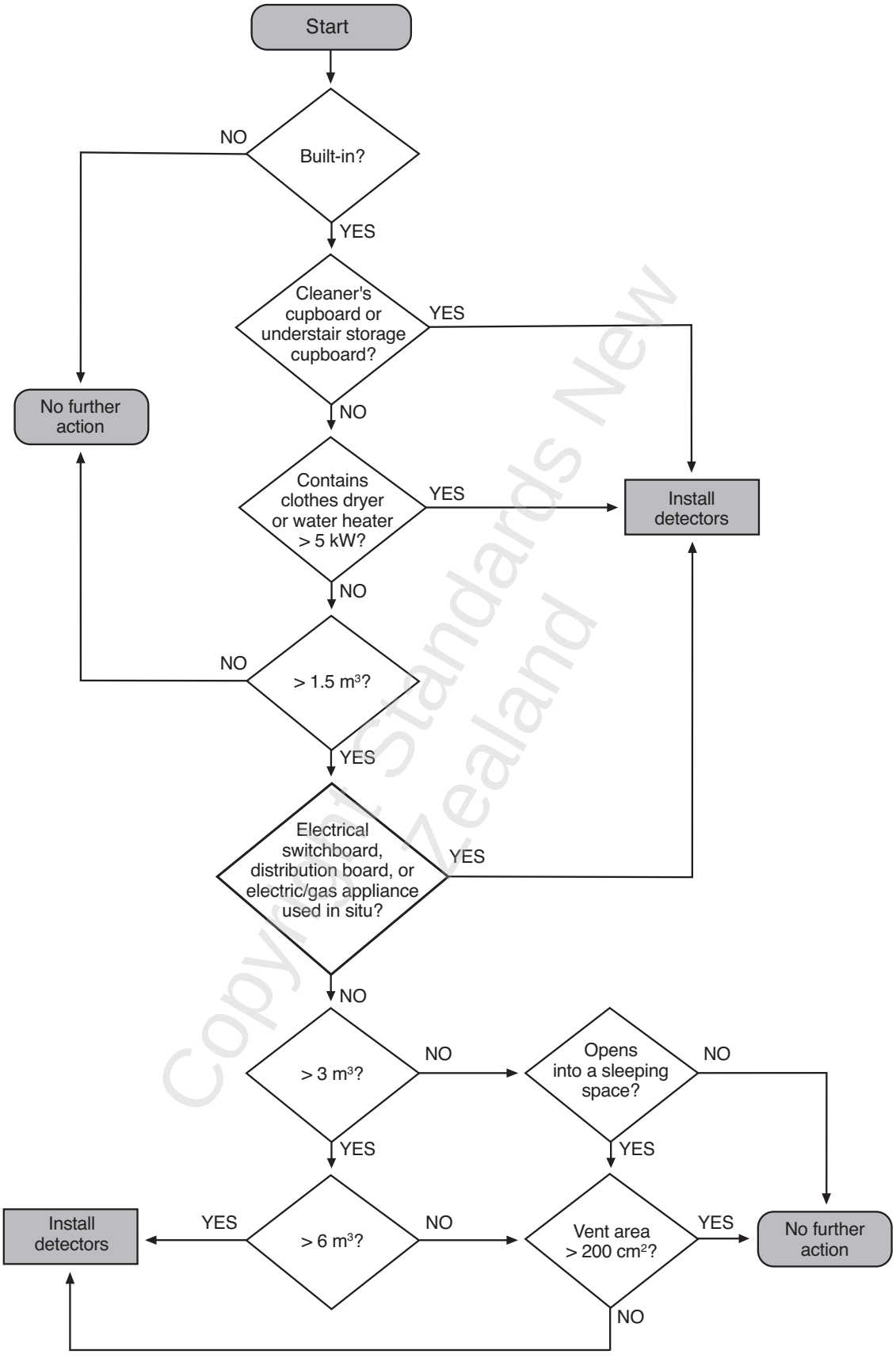
(D) For aspirating smoke detectors see 4.7.15

(ii) In areas with ceiling 10 m to 20 m height, according to the manufacturer's data sheet, and

(iii) In areas with ceilings exceeding 20 m in height as per 4.5.7;

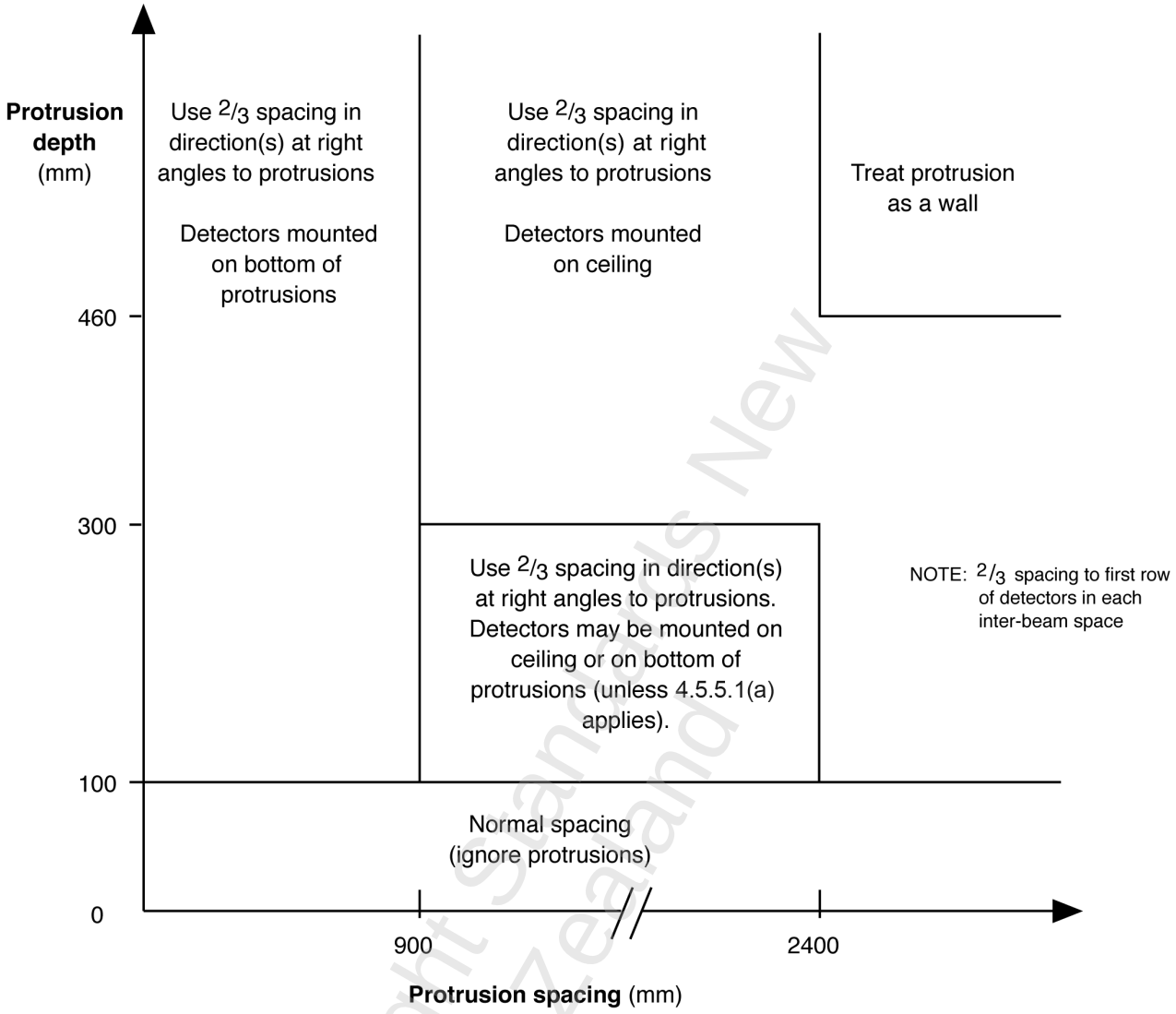
(f) In other cases of unusual roof or ceiling geometry, detectors shall be installed in positions that approximate to that shown in the relevant diagrams of Figure 4; and

(g) Such that the correct operation is not prejudiced or delayed by ambient conditions such as corrosion, dampness, high ambient temperature, vibration, stratification, cool air currents, ventilation systems, dust or dirt accumulation, high airflow, or the like.



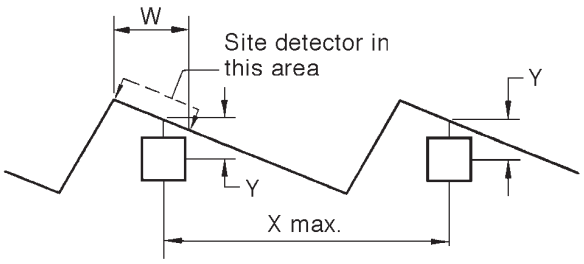
NOTE – See 4.5.2(j) to (o).

Figure 2 – Protection of built-in storage enclosures (for example, cupboards and wardrobes) flow chart

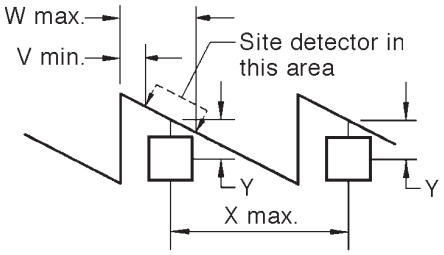


NOTE – See 4.5.3(d).

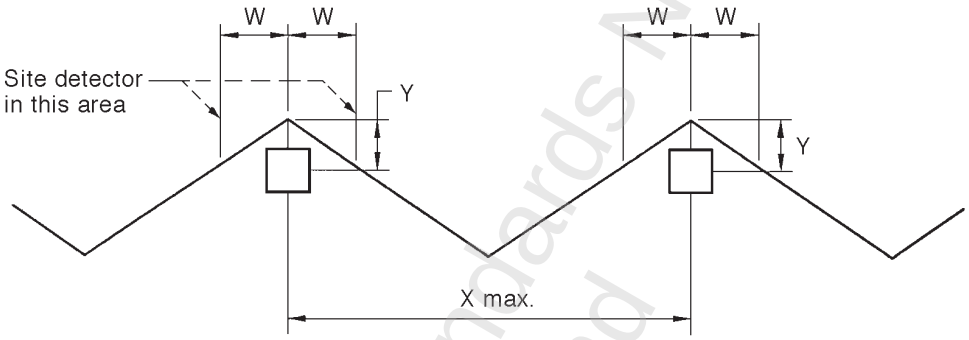
Figure 3 – Effect of protrusions (beam, joist, purlin) on detector location and spacing



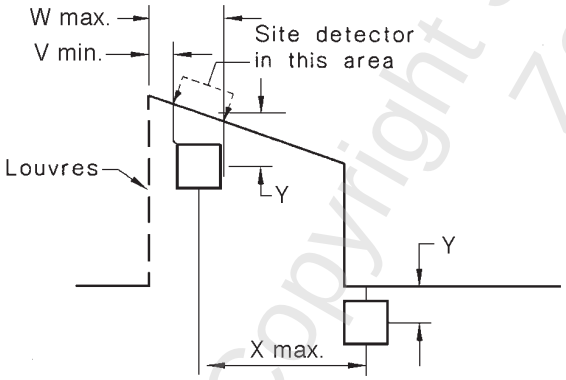
(a) Unequal sloping surface



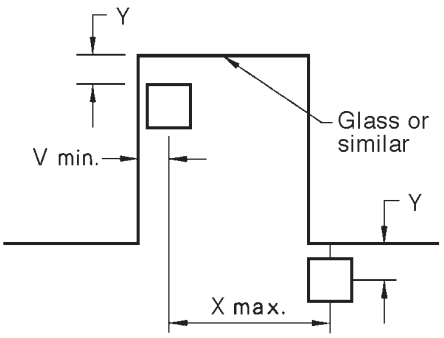
(b) Sawtooth ceiling, roof or surface



(c) Equal sloping surface



(d) Louvred ceiling or roof with louvred riser



(e) Ceiling, roof or surface with skylight

V = Minimum distance from wall as per 4.5.3(c)

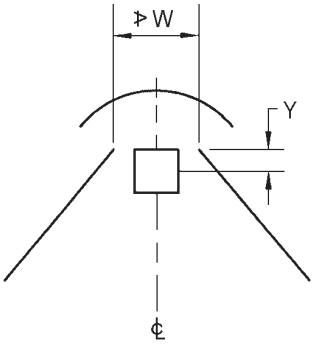
W = Maximum distance from apex as per 4.5.3(a)

X = Detector spacing as per 4.5.5

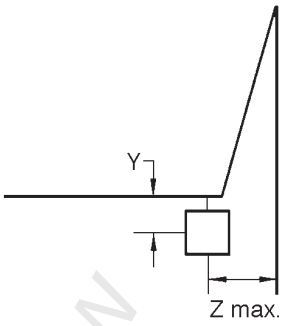
Y = Distance from ceiling or roof as per 4.5.3(e)

Z = Spacing from wall or partition as per 4.5.5

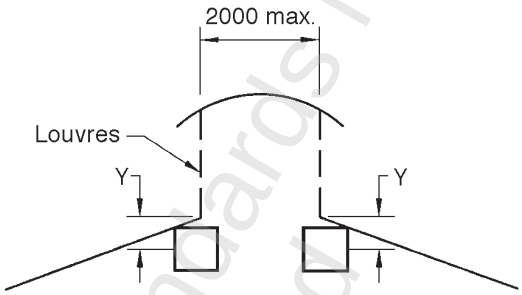
Figure 4 – Typical detector locations at apex of ceiling, roof, or surface



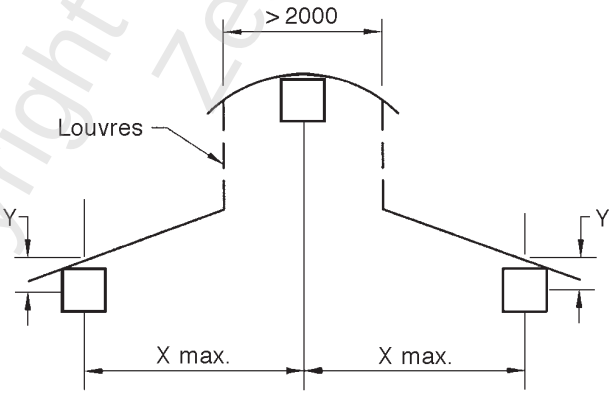
(f) Ventilated ridge



(g) Narrow apex



(h) Ventilated ridge (greater than W)



(i) Ventilated ridge (greater than 2000 mm)

NOTE –

(1) Detector is always on the side with least slope.

(2) See 4.5.3(f).

(3) All dimensions are in millimetres.

Figure 4 – Typical detector locations at apex of ceiling, roof, or surface (continued)

4.5.4 Detector coverage

4.5.4.1

Partial coverage of a building (or firecell) is not permitted with the exception that detectors may be omitted from the following spaces:

(a) Concealed spaces that are fire isolated with a minimum fire resistance rating (FRR) of 15/15/15 and contain a low fire load, and do not contain any likely sources of ignition;

NOTE – Flush-mounted light fittings, small air conditioning dampers, small fans and associated wiring, unterminated cabling, and timber framing construction in such concealed spaces are considered low fire load and are not considered to be likely sources of ignition for the purposes of this standard.

(b) Concealed spaces, irrespective of depth between the lowest floor and ground, that do not contain equipment or stores, and to which there is no access;

NOTE – Access to concealed spaces applies to general building users, not specialist tradespeople. A small secure manhole or trapdoor (internal or external) is acceptable for a concealed space without constituting 'access', unless there is evidence the space is regularly occupied or used for storage.

(c) Concealed spaces less than 800 mm deep between false ceilings and fire-resisting slabs above that contain a low fire load, and do not contain any likely sources of ignition;

(d) That part of concealed spaces under roofs that contain a low fire load, and which are less than 800 mm deep between the underside of the roof sheathing to the top of the ceiling lining (see also 4.5.4.2);

(e) Individual shower and toilet cubicles that open off a protected room, and where the doors or walls or both are not full height;

(f) Adjacent firecells (unless required by the New Zealand Building Code or the declared functional requirements – see 1.6);

(g) Where there is a false ceiling of a perforated type and the open area, consisting of individual holes each at least 625 mm^2 (6.25 cm^2) in area, exceeds 50% of the total area, it is sufficient to locate detectors on the main ceiling above the false ceiling;

(h) Where sprinkler heads are installed as part of a Type 6 or Type 7, heat detectors may be omitted.

NOTE – 4.5.4.1(h) applies even where the coverage or placement requirements for sprinklers are less onerous than the requirements of this standard for heat detectors.

4.5.4.2

If the roof pitch means that the width of the space that is less than 800 mm deep is greater than 3.0 m, then the first line of detectors shall coincide with the line at which the depth of the roof space is 800 mm.

4.5.5 Detector spacing

4.5.5.1

Point-type heat detectors shall be spaced and located in the optimum position for exposure to the flow of hot fire gases during a fire and as follows:

(a) Located at the highest point of the low side pocket formed by beams or other members which project more than 100 mm from ceilings when the ceiling slope is 6° (1 in 10) or more. The heat collector shall not project below the bottom of the beam;

(b) Not exceeding 6.0 m centres in general areas and 9.0 m in corridors;

(c) Not exceeding 3.0 m at centre from any wall or partition in general areas, and 4.5 m in corridors; and

(d) Not less than one detector for each 30 m^2 of floor area.

4.5.5.2

Line-type heat detectors shall be installed, spaced, and positioned as follows:

(a) In accordance with the conditions of 4.5.2, 4.5.3, and 4.5.4 as far as they are applicable and appropriate (see Appendix K);

(b) Lines shall be so disposed throughout the building that adjacent lines are not more than 8.0 m apart and are placed no more than 4.0 m from any adjacent wall or partition or 5.7 m from any other point in the area covered;

(c) Mounted and laid in accordance with the detector manufacturer's instructions (for example, minimum bend radius);

(d) Line-type heat detection cable shall be installed within the zone of detection only. Feeder cables shall be in accordance with 4.2.1 and 4.2.2; and

(e) The end of line device and any load resistor fitted in series with the line-type heat detection cable shall be located within the zone of detection as close as practicable to the line-type heat detection cable, and shall both be accessible for testing purposes per 4.3.6.

Where a line-type heat detector is made up of a number of individual sensing elements, each element shall be considered as a point-type detector for spacing purposes.

Within the zone of detection, subsections of line-type heat detection cable may be interconnected by other cables in accordance with 4.2.1 and 4.2.2. All junctions shall comply with 4.2.2(e).

4.5.5.3

Point-type smoke detectors shall be spaced and located in the optimum position for exposure to the products of combustion from a fire and as follows:

(a) Not exceeding 10.0 m between detector centres;

(b) Not exceeding 5.0 m, and not less than 200 mm at centre from any wall or partition; and

(c) Such that no point in the room is more than 7.0 m from the sensing element of the nearest detector.

4.5.5.4

Beam-type smoke detectors shall be spaced and positioned as follows:

(a) With their projected beams normally parallel to the ceiling and in accordance with the manufacturer's instructions;

(b) In accordance with the conditions of 4.5.2, 4.5.3, and 4.5.4 as far as they are applicable and appropriate (see Appendix K);

(c) Located throughout the building so that adjacent beams are not more than 14.0 m apart and all points in the area covered are within 7.0 m of the sensing element of a beam; and

(d) Mounted within 600 mm horizontally from the apex of each apex type roof.

4.5.5.5

Combined smoke and heat detectors shall be spaced and positioned as for smoke detectors, unless otherwise specified in the declared functional requirements (see 1.6). If combined smoke and heat detectors are installed in a Type 5 system, with the smoke-sensing element controlling the Type 5 operation and the heat-sensing element controlling the Type 3 operation, the combined detectors shall be spaced as for heat detectors.

4.5.5.6

Aspirating smoke detection sampling points for room protection shall be spaced so as to comply with 4.7.2 but shall not be at greater spacing than the requirements for point-type smoke detectors in 4.5.5.3.

4.5.5.7

Detectors other than heat or smoke detectors shall be spaced, positioned, and mounted according to the detector manufacturer's instructions (see also 4.5.1.1).

4.5.5.8

For sloping ceilings, the detector spacing distances shall be based on the horizontal projection of the ceiling. A roof or ceiling with a slope of less than 6° (1 in 10) may be deemed to be flat.

4.5.5.9

Smoke detectors in ducts shall be installed according to the duct housing manufacturer's instructions and the requirements of any applicable standards. Air velocity limitations shall be established and complied with.

4.5.5.10

Detectors shall be located and configured, as far as is reasonably practicable, to minimise the likelihood of unwanted activations as a result of any activity or condition typical of the installation environment (see also Appendix J).

4.5.6 Detector indicators

Detectors shall be installed such that the indication of their operation is readily apparent to a person standing beneath the detector under normal conditions of illumination. ➤

Unless a zone uniquely defines all the detectors located in a ceiling or concealed space, additional indication of their operation shall be given by means of an easily discernible, labelled indicator situated in an adjacent normally accessible space. Such indication may be common to multiple detectors in a concealed space.

A detector rated at 80°C or higher installed in an area of high ambient temperature may have its visual indicator located in an adjacent (cooler) area, provided the indicator's labelling readily identifies the detector. Alternatively, the indicator for such a detector may be omitted if unique detector identification is readily accessible by the fire brigade from the fire brigade attendance point (for example, a separate zone indicator or LCD as in 4.1.2.4(a)).

4.5.7 Ceilings exceeding 20 m in height

4.5.7.1

In open areas with ceilings exceeding 20 m in height, detector selection, location, and spacing shall be in accordance with specific design that demonstrates adequate performance to meet the system's declared functional requirements (1.6) and system type (1.7 and 2.1.5). Designers shall consider the following:

(a) The entire contiguous volume in the area concerned;

(b) Elevated sub-areas of this volume, whether or not exceeding 20 m in height;

(c) Other areas of the building into which there is a free flow of air, smoke, and heat; and

(d) The effects of temperature, stratification, air currents, and ventilation systems on all of these.

NOTE – Additional detectors at intermediate levels will generally be required in areas exceeding 20 m in height.

4.5.7.2

Specific design in accordance with 4.5.7.1 is not required for enclosed limited-area vertical structures and penetrations such as stairways, hoists and lift wells, service ducts, chutes, above rope or belt openings, and skylights.

4.6 Alerting devices

4.6.1

Audible alerting devices used throughout a building shall produce the evacuation signal of Appendix G (including verbal message) except as permitted in 4.6.5, 4.6.7, and 4.6.11, or as follows:

(a) Where audible alerting devices are added as part of an extension to an existing system the additional devices installed may produce the existing sound type (without verbal message) or alternatively, all alerting devices may be upgraded to produce the evacuation signal of Appendix G (including verbal message); and

(b) Where an additional system is installed on a site with an existing uniform, site-wide evacuation sound, the audible alerting devices on the additional system may produce the existing sound type, but shall also include a verbal message complying with Appendix G.

The audible alerting devices shall produce identical evacuation signals throughout the building.

4.6.2

Verbal messages forming part of the audible signal shall provide clear and readily understandable instructions. The verbal evacuation message shall be consistent with the building's evacuation scheme and should include the word 'evacuate' as well as the word 'fire' or 'emergency' or both (see G4).

NOTE – Synchronisation will be necessary in common or open areas.

4.6.3

At any location within the signal reception area, the maximum A-frequency-weighted F-time-weighted sound pressure level (SPL) of the audible alerting devices L_{AFmax} measured over a complete signal cycle by a meter to BS EN 61672-1 shall exceed the residual sound level (see 1.4) by at least 10 dB where voice facilities are used for evacuation purposes, or by at least 5 dB where voice facilities are not used. The audible signals, however, shall not be less than 65 dB L_{AFmax} and not more than 100 dB L_{AFmax} measured at any normally accessible point in the room at a height of 1.8 m. In buildings providing sleeping accommodation, the audible signals shall be at least 75 dB L_{AFmax} at the bedhead unless 4.6.5 or 4.6.7 apply. Sound pressure levels (SPL) shall be measured with all doors closed. For occupiable balconies, the audible signals shall be at least 65 dB L_{AFmax} measured with the balcony door open.

4.6.4 Visual alerting devices (VADs)

4.6.4.1

Where required by the declared functional requirements, visual alerting devices (VADs) shall be installed in commonly accessible spaces and high-noise environments such as theatres and nightclubs. Where required in stairwells a VAD shall be installed at each full-floor landing.

4.6.4.2

Where VADs are used, the intensity and the location of the visible signals shall ensure occupant perception by providing a minimum required illumination of 0.4 lux on surfaces perpendicular to the direction of the light emitted from the VAD. This shall be determined by system design (see Appendix L) and shall take all of the following into account:

(a) Both direct and indirect viewing of VADs;

(b) The direction occupants would be expected to face or travel;

(c) The reflectivity of walls and other finished surfaces; and

(d) Ambient lighting levels.

NOTE – Product manufacturers' application notes should be provided as supporting evidence for the application design.

4.6.4.3

VADs should be installed in sufficient quantity so that wherever possible at least one VAD is directly visible within the occupied space covered.

4.6.4.4

VAD selection shall be appropriate for the intended space.

Wall-mounted VADs shall be located so as to be clearly visible, with their lens area within the limits of 2000 mm and 2400 mm from floor level.

Ceiling-mounted VADs shall not ordinarily be installed higher than 9.0 m from floor level nor higher than the manufacturer's design rating. In high-ceiling installations they may be securely suspended below the ceiling to achieve these requirements.

NOTE – In multipurpose facilities where movable elements might be deployed, or in warehouses, cold storage, libraries, convention centres, and other building types and where VADs might not always be visible when installed at the specified heights, the optimal placement of VADs can require customised solutions.

4.6.4.5

All VADs used for an evacuation signal shall produce the same colour flash and flash rate throughout the building.

Where two or more VADs are directly or indirectly visible from a common location, the flash timing shall be synchronised. The deviation between individual flashes shall be no greater than 0.05 s.

4.6.4.6

Where the ambient sound level (see 1.4) exceeds 90 dB $L_{Aeq(10min)}$ or where ear protectors are routinely worn by all occupants of an area, VADs shall be provided.

In such situations, or in harsh environments, or in explosive atmospheres, VADs are not required to comply with the standards listed in 2.18.5(a), however, they shall meet all other performance requirements of this standard.

4.6.4.7

In corridors up to 6.0 m wide the distance between VADs may be extended but shall be no greater than 30 m. A VAD should be located within 4.5 m of each end of any corridor. Corridors greater than 9.0 m in length shall have a minimum of two VADs. For each change in direction, or obstruction of visibility, such as a fire door, each space shall be treated as a separate corridor. For long corridors wall-mounted VADs should be staggered either side of the corridor.

NOTE – This relaxation in spacing is allowed because corridor occupants are typically moving and are more aware of their surroundings.

4.6.4.8

In large open spaces (such as auditoriums, function halls, and theatres) with ceilings higher than 9.0 m, VADs shall be located in sufficient numbers on the perimeter walls at a maximum spacing of 30 m and no further than 4.5 m from end walls and shall be clearly visible throughout the space. Supporting posts in the centre area should also be fitted with additional VADs.

4.6.4.9

If the normally expected ambient light level is significantly outside the range of 300 to 500

lux the manufacturer's specified rating for VAD spacing should be adjusted according to Table 1. See also Appendix L.

Table 1 – Ambient light level multiplication factors for VAD spacing

Ambient light level (lux)	Ceiling mount direct view	Ceiling mount indirect view	Wall mount direct view	Wall mount indirect view
< 100	2.8	1.3	5.2	1.8
100 to 200	2.4	1.2	4.4	1.7
200 to 300	1.9	1.0	3.2	1.4
300 to 400	1.4	0.8	2.3	1.2
400 to 500	1.1	0.6	1.8	1.0
500 to 600	0.9	0.5	1.3	0.9
600 to 700	0.7	0.4	1.0	0.7
700 to 800	0.5	0.3	0.7	0.6
EXAMPLE: For an ambient light level of 750 lux, ceiling mount VADs in direct view of occupants should be installed at half the manufacturer's rated spacing.				

4.6.5

Where audible alerting devices could cause occupants distress in areas of buildings, or where such devices would preclude proper conduct of critical or emergency functions, other suitable means of quickly alerting occupants shall be permissible in those areas as follows:

(a) In care or detention facilities in which there are on-duty staff available whenever occupants are present, low level audible or visual or combined audible and visual devices shall be provided to alert all such staff wherever they may be located and whatever normal duties they may be undertaking; and

(b) In other areas, low level audible or visual devices or both, to alert all occupants.

The character of the sound is not required to comply with 4.6.1.

In both cases, provision may be made for a responsible person to silence (after they have operated) the sounders of audible or visual warning devices or both, in that person's area of responsibility. All visual devices shall continue to operate.

4.6.6

A minimum of two alerting devices per system shall be installed.

4.6.7

The type of alerting devices in hospital wards or other areas where care is provided may be a combined pulsing light and low sound level sounder that is common to all such areas where 4.6.1 is not complied with. Such devices shall have:

(a) A visual alerting device (see 2.18); and

(b) An audibility level of no less than 5 dB above ambient sound level (see 1.4). If the sounder is pulsed, then it shall pulse at the same rate as the pulsing light.

The sound character of such devices is not required to comply with 4.6.1.

4.6.8

An EWIS installed to comply with AS 1670.4 may be used as the alerting device, however audible alerting signals, verbal messages, and intelligibility measurement shall be as per 5.1.2 and Appendix G.

4.6.9

The label required by 2.18.4 or 2.18.5(b) shall be located on or adjacent to the alerting device and sized to be readable when installed from a point 1800 mm above the floor.

4.6.10

Where the position of the indicating unit is not readily visible from the point of fire brigade attendance, an alerting device (visual or audible) shall be located on the exterior of the building in such a position so as to draw attention to the location of the indicating unit.

Such visual alerting device may be coloured blue and is not required to be a listed device.

4.6.11 Type 5 systems

Where a building is protected by a Type 5 fire alarm system, the smoke detectors within any household unit or suite shall generate a non-latching alarm signal within the household unit or suite only. Where a management response is available, a local signal shall also be communicated to the management (see 1.6(f)).

The character of the sound is not required to comply with 4.6.1, however, care should be taken to select a sound character that will meet audibility requirements. If a verbal message is included, it shall be appropriate to a Type 5 smoke detector alarm and shall be preceded by a series of tones and shall include the words ‘smoke alarm’ and an instruction.

NOTE – The recommended tone is a pulsed (500 ms on, 500 ms off) 520 Hz square wave signal as this has been shown to be more effective at waking a wider range of people.

A readily accessible means (‘hush button’) shall be provided within each household unit or suite for occupants to silence (mute) the local alarm signal in that household unit or suite for periods not exceeding 2.0 minutes.

Each hush button shall be at all times clearly visible and positively identifiable as part of the fire alarm system with instructions on its use. It shall be securely mounted with its centre at a height of 1200 mm to 1500 mm above floor level.

NOTE – The recommended location for a hush button is in the main occupied area – lounge, dining room, main hallway, or adjacent to the main exit. A hush button should not be located in a pantry, cupboard, bathroom, or utility room.

4.6.12

Where staged evacuation is part of an evacuation scheme, the system should signal the evacuation alarm of 4.6.1 in the zone(s) or firecell(s) from which the alarm has originated, and sound the audible alert signal of 2.18.8(c) in all other zones or firecells unless otherwise specified in the approved evacuation scheme.

4.6.13 Other fire protection systems

Any other fire protection system that complies in all respects with the requirements of the published technical Standard for such systems (for example, sprinkler, deluge, gas flooding) may be connected to operate the alerting devices without initiating a fire alarm from the fire alarm system, provided that evacuation of the building is an appropriate and prudent response to the activation of the other fire protection system. In such cases the interconnection between the two systems shall be supervised by the fire alarm system, and a defect warning shall be provided in the manner of 2.8.1(b) (see also Appendix D).

Such systems shall be separate from the building fire alarm system and shall not share any detector, power supply, or control unit.

The location and extent of any other fire protection system shall be readily identifiable on the fire alarm system zone index.

A notice shall be placed on or inside the service access door of the main control unit to advise test and maintenance personnel of any other fire protection systems connected.

NOTE – The Fire Protection Association NZ has published a series of codes of practice for such systems.

4.6.14

For installations with more than five zones a fire microphone (see 2.18.10(c)) for use by the fire brigade is recommended at the main brigade attendance point. Where this microphone could be subject to unauthorised use its 'press to talk' switch shall be enabled only by the separate operation of an adjacent 'Bulgin 6083/C' patterned key switch clearly designated 'FIRE MICROPHONE ENABLE'. The key shall not be removable in the enable position.

4.6.15

If the alerting devices are used for other purposes (for example, school class change) the following additional conditions shall all be satisfied:

(a) The fire alarm signal shall be easily distinguishable from all other signals (for example, by sound character, cadence, or continuous sound);

(b) The fire alarm signal shall take priority over and override all other signals; and

(c) The battery charger and batteries shall be adequately sized to account for the additional working load.

4.6.16

In addition to supplying the full system alarm load, the mains power supply or charger (see 2.12.2) shall be capable of supporting any inrush or peak current demands of the alerting devices without assistance from the batteries.

The system design shall ensure the voltage at the last alerting device on each circuit is not lower than the device's specified minimum operating voltage when the system supply voltage is at 80% of the nominal battery voltage.

4.7 Multi-point aspirating smoke detectors

4.7.1

Multi-point aspirating smoke detectors may be used to provide conventional room protection in compliance with 4.5.2(a), where installed in accordance with 4.7.2 to 4.7.16.

Where a declared functional requirement (see 1.6) is for detection of very low levels of smoke or of pre-combustion aerosols in specified items of equipment or in certain areas, multi-point aspirating smoke detectors may be used if installed in accordance with 4.7.4, 4.7.7, 4.7.9, 4.7.11, 4.7.12, and 4.7.13. This shall be either as an adjunct to general coverage by other forms of detector or on a stand-alone basis according to the tenor of the declared functional requirements.

4.7.2

The aspirating system manufacturer's design and installation requirements shall be complied with where these do not conflict with the requirements of this standard.

4.7.3

The total system design shall ensure that each sampling point has a sensitivity equal to or greater than an equivalent point-type smoke detector covering the same area. This shall be verified using the manufacturer's design tools.

4.7.4

The air-sampling network design shall be such that the amount of airflow drawn from the farthest sampling point (not end cap) of each pipe branch is at least 50% of that drawn from the sampling point nearest the detector.

NOTE – Manufacturer's design tool calculations showing the network design according to the above criteria should be provided as a means of demonstrating compliance.

4.7.5

The aspirating system design shall ensure that the maximum smoke transport time does not exceed the limit shown in Table 2 below for the class specified in the declared functional requirements or system design.

Table 2 – Classes of aspirating smoke detectors and their characteristics

Class	Maximum permitted smoke transport time	Sensitivity	Typical applications
Class A	60 s	Very high sensitivity	Computer/clean rooms
Class B	90 s	Enhanced sensitivity	Large open spaces
Class C	120 s	Normal sensitivity	Hot/cold/wet/ restricted access areas

4.7.6

If the end cap of a pipe has been drilled with a hole, the end cap shall be located so as to draw air from the same detection area as the sampling points.

4.7.7

The installation and alignment of any part of the system shall be such that it can be easily maintained. The sampling point orientation shall not jeopardise the long-term reliability and performance of the system.

End caps of pipes shall be installed in a readily accessible location but do not need to be contained within the height limits specified in 4.3.6.

4.7.8

Each sampling point shall have an orifice sized to facilitate the correct operation of the system in accordance with the system design data. Each single compartment or room in excess of 15 m^2 shall have a minimum of two sampling points.

4.7.9

Sampling points shall not be painted or coated with any substance that will reduce the size of the opening. Sampling points shall be deburred internally.

4.7.10

The location of the sampling point shall be marked in a contrasting colour.

4.7.11

Aspirating network pipes shall be installed in accordance with AS/NZS 3000 requirements for flexible conduit or rigid non-metallic conduits (as appropriate). All joints shall be airtight.

4.7.12

Capillary tubes used to branch from the main sampling pipe shall be fixed at both ends so that the joints have a withdrawal force of not less than 10 N.

4.7.13

Capillary tubes shall not restrict the airflow by changes of direction or reduction in cross-sectional areas. Non-metallic capillary tube materials shall comply with the relevant requirements of AS/NZS 4130.

4.7.14

Where the system piping is concealed, the air-sampling points attached to the capillary tubes shall be clearly identifiable by a label reading ‘FIRE DETECTION SYSTEM – DO NOT PAINT’.

4.7.15

Sampling points for room protection shall be not more than 300 mm or less than 25 mm from the ceiling.

NOTE – The lower limit of the mounting position of the sampling point may be changed to suit individual applications as determined by smoke tests.

4.7.16

Where the aspirating smoke detection system is capable of providing a range of alarm levels, those used to generate fire alarms shall be sufficiently high to prevent unwanted alarms.

4.8 Wireless detection technology

4.8.1

A single wireless connection or device failure shall not result in the loss of coverage of more than one zone as defined by this standard.

4.8.2

The main indicating unit shall clearly show that the system is equipped with wireless devices.

4.8.3 RF site survey

Radio waves have entirely different characteristics from wired connections. It is important to ensure that all potential interruptions of the radio signal are identified and mitigated when designing and installing a wireless detection system.

Prior to the installation of any wireless detection equipment, a full site radio frequency (RF) survey shall be conducted using equipment and procedures recommended by the wireless detection system manufacturer.

The RF site survey shall comprise all of the following:

(a) Confirm first that wireless detection technology is permitted to be used on site;

(b) Confirm the overall suitability of the building for wireless detection equipment;

(c) Confirm the suitability of the actual wireless equipment proposed for installation;

(d) Identify areas of poor wireless signal strength;

(e) Identify sources of wireless signal interference; and

(f) Identify any requirements for additional wireless transmitters/receivers or signal boosters.

The RF site survey shall be conducted either by the supplier of the wireless detection equipment or by a person who has been trained to the satisfaction of the equipment supplier.

A copy of the RF site survey report shall be included with the commissioning documents required by 8.4.1.

4.9 Delay timers

4.9.1

Delay timers may be used to enable investigation of fire alarm activation where processes or the environment may cause unwanted alarms, and where a proper management process can be instituted to establish the cause of the fire alarm. However, delay timers should not generally be used to delay remote signalling or a general activation of the alerting devices.

4.9.2

The activation of two or more detectors within a zone that is under delay control shall cause that delay timer to be overridden.

4.9.3

Delay timers shall not be used as a substitute for proper system engineering to prevent unwanted alarms due to environmental conditions (see 4.5.1.1).

4.9.4

Delay timers are an integral part of the system design and shall be used only where explicitly approved by the BCA or TA. Delay timers shall also be accounted for in the building's fire evacuation scheme approval.

4.9.5

Delay timers shall not be used to delay alarms from manual call points or heat detectors.

4.9.6

Any time delay period before remote signalling or general building evacuation should be kept to an absolute minimum.

4.10 Owner isolation facilities

4.10.1

Owner isolation facilities may be provided to prevent a remote alarm being signalled from smoke detectors on Type 7 systems (or where a remote connection is not required) due to predictable unwanted alarms from specific occupant activities (for example, manufacturing processes or theatrical smoke).

4.10.2

Owner isolation facilities shall be used only on Type 7 systems or where a remote connection is not required.

4.10.3

Owner isolation facilities are an integral part of the system design and shall be used only where explicitly approved by the BCA or TA. Owner isolation facilities shall also be accounted for in the building's fire evacuation scheme approval.

4.10.4

Owner isolation facilities shall not be used to inhibit alarms from manual call points or heat detectors.

4.10.5

Owner isolation facilities should not generally be used to inhibit a general activation of the alerting devices.

4.10.6

Where provided, owner isolation facilities shall be accessible from the outside of the control unit and secured against unauthorised use. Positive indication shall be given whenever devices are isolated.

4.11 Explosive atmosphere installations

4.11.1

Detector and manual call point indicators of operation may be omitted in areas classified as having explosive atmospheres provided each such area (and any non-classified area immediately above it) is designated a separate zone.

NOTE –

(1) An area classified as having an explosive atmosphere is often restricted to a certain distance above floor level.

(2) Areas classified as having an explosive atmosphere were previously called 'hazardous areas'.

4.11.2

Open-circuit or short-circuit initiating of a fire alarm is permitted in detectors and circuits serving only an area classified as having an explosive atmosphere (and any non-classified area immediately above it).

NOTE – There are overriding legal requirements (see 1.9) applicable to the safeguarding of areas with an explosive atmosphere, which include requirements for safety barrier devices, simple or certified apparatus, and the physical protection of cabling.

5 COMMISSIONING

5.1 General

5.1.1

Each completed system shall be commissioned and inspected to ensure compliance with the requirements of this standard. The relevant inspection and testing requirements of this section shall be carried out for all multi-zone fire alarm systems and, where applicable, for single-zone fire alarm systems.

The installer shall perform and report on the examinations and tests specified in 5.1 to 5.4. The required installer's declaration of completion is included in Appendix M.

Where required by 5.5, commissioned systems shall be inspected and certified as described in 5.5 by an accredited inspection body.

Commissioning records shall be completed as specified in section 8

5.1.2

EWIS shall be commissioned in accordance with AS 1670.4 (as qualified by 4.6.8). Speech intelligibility testing by instruments per AS 1670.4 is not required; assessment 'by ear' is acceptable.

5.1.3

Where the maintenance of any part of a fire alarm system is inadequately covered by section 6, the designer shall compile a draft compliance schedule to provide maintainers with guidance on those parts of the system. The installer shall attach any draft compliance schedule clauses to the certificate of compliance (see 5.5) and submit a copy to the BCA or TA for their consideration as a part of the building's compliance schedule.

5.1.4

For existing systems, whenever any alterations are made, configurations are changed, or components are repaired, replaced, or added, sufficient testing shall be undertaken to verify the correct operation of the changed elements, and that the overall system remains in good working order.

5.2 Visual examination

A visual examination of the system as a whole shall be made, checking in particular all of the following:

(a) Wiring of the control and indicating units;

(b) Where connected, the type of signalling equipment is compatible with the remote receiving centre equipment;

(c) Electrical supply, including batteries, battery accommodation, and wiring;

(d) Cable;

(e) Location and area of coverage of detectors;

(f) Manual call point location;

(g) Alerting device locations;

(h) The logbook and documentation specified in section 8 has been supplied;

(i) The marking of components is in accordance with 2.25 and 4.2.12;

(j) The zone control and indicating units have been located correctly in relation to the fire brigade attendance points;

(k) That zones have been correctly designated; and

(l) That indicators and legends, when operated, clearly indicate their function at a viewing distance of 2 m.

5.3 Tests on electrical equipment

The following tests shall be carried out on all the electrical equipment:

(a) Test that all circuit wiring external to the control unit is isolated from the building earth using the test method specified by the system manufacturer;

(b) Verify that the electrical wiring is in accordance with the requirements of the relevant statutory requirements for 230 volt installations;

(c) Verify that the time delay from operation of a detector or manual call point to the fire alarm signal operation does not exceed 15 s and that a 1 s operation of a manual call point latches the system (see 2.4.5);

(d) Where ancillary services are connected to the system, verify that the voltages do not exceed the limits specified in 2.3.4;

(e) Check all loudspeaker circuits to ensure that the connected load does not exceed the circuit's output rating. This check should be performed using an audio impedance meter or equivalent;

(f) Verify that each battery complies with 2.13 or 2.14, as appropriate;

(g) To comply with 2.13, the rated capacity of a battery shall be greater than the minimum, calculated as follows:

For a remotely connected system: $Ah = (I_Q \times 24) + I_A$

For a non-remotely connected system: $Ah = (I_Q \times 72) + I_A$

where:

Ah = the minimum rated battery capacity, in ampere hours at the 10 h rate

I_Q = the non-alarm current from that battery (charger off) in amps

I_A = the alarm current drawn from that battery (charger off) in amps;

NOTE – A times-2 derating factor has been applied to the alarm capacity to compensate for battery conversion inefficiencies.

(h) Verify that the output of any power supply or battery charger complies with the requirements of 2.12. The minimum allowable output rating for a power supply or battery charger shall be calculated as follows:

$A = I_Q + (Ah/24)$

or

$A = I_A$

whichever is greater

where:

A = the minimum allowable battery charger output rating in amps

I_A = the alarm current drawn from that battery/charger combination (charger off) in amps

I_Q = the non-alarm current drawn from that charger (battery disconnected) in amps

Ah = the minimum rated battery capacity calculated in 5.3(g), in ampere hours at the 10 h rate.

5.4 Tests to verify correct operation and function

5.4.1

The following tests shall be carried out to verify the correct operation and function of the system:

(a) All detectors shall be checked to confirm that they are connected to the correct circuit or loop;

(b) All manual call points shall be confirmed to operate correctly, except those designed for once-only operation;

(c) All alerting devices shall be confirmed to function correctly, as per 4.6.3 and 4.6.4, including sound pressure levels and visibility;

(d) Control and switching facilities shall all function correctly;

(e) Visual indicators shall all operate correctly, including a check that the correct zone is indicated and that alphanumeric display descriptions are correct for all devices;

(f) The removal of a detector results in a defect warning;

(g) The removal of a manual call point results in a defect warning;

(h) Defect warning facilities shall operate correctly when tested by simulating the appropriate defect condition in accordance with 2.8.1;

(i) Where connected to a remote receiving centre, and with the complete system in the normal operational condition, the operation of a detector or manual call point results in a fire alarm signal being received;

(j) With the complete system in the normal operational condition, the operation of a detector or manual call point results in the appropriate alerting devices operating;

(k) Where staged evacuation is used, testing shall be carried out to confirm correct functionality;

(l) Where facilities are provided for evacuating by zones, a test shall be carried out to check that all alerting devices operate when the controls are in the total evacuation mode;

(m) Appropriate testing shall be performed on multi-point aspirating smoke detection systems to ensure that the design objectives for sensitivity, proportion of air, and transport time have been achieved;

(n) Appropriate testing shall be performed on any specialist detection to confirm correct operation and function; and

(o) Check that the Type 5 local smoke detection, alerting, and hush facilities perform correctly in all household units and suites.

5.4.2

Sample in-situ testing of detectors shall be performed as per 6.3.3. Particular care should be taken to select a representative sample. Line-type heat detectors shall be tested at both ends of the sensing element.

NOTE – Smoke detector testing is vital for detecting initial contamination due to construction work.

5.4.3

End-to-end operational testing shall be conducted on all ancillary services interfaced with the fire alarm system to ensure that all the ancillary signals (for example, smoke control system, lift override, access control, conditional signage) have been provided and function correctly.

NOTE – See the Fire Protection Association NZ Code of Practice for Integrated Building Systems (in preparation) for further recommendations on specification, documentation, and testing of ancillary services interfaces.

5.4.4

Testing shall be conducted on any wireless detection equipment to validate the correct operation and functioning of every wireless device.

The record of such testing shall include all of the following information:

(a) Battery condition for each wireless device;

(b) Signal strength for each wireless device; and

(c) Activation for each wireless device.

5.5 Inspection, testing, and compliance certification

5.5.1 General

An inspection report shall be provided by an accredited inspection body (see 1.4). If inspection, testing and other verification activities confirm full compliance, a certificate of compliance shall also be provided by the accredited inspection body to confirm that there are reasonable grounds to believe the installed system complies with this standard and any other requirements specified for compliance.

Inspection and testing shall be carried out as detailed in 5.5.2, 5.5.3, or 5.5.4 as applicable.

The inspection report shall, where applicable, contain at least the following information:

(a) General system information;

(b) Photograph of the installed fire alarm index and its location;

(c) Device designation (see 4.2.12) of detectors and manual call points tested;

(d) Results of SPL or visibility test for each zone, and each bedhead for sleeping occupancies;

(e) Internal photograph of control unit;

(f) Copy of completed check sheets used (inspection sheet(s));

(g) Design information (see 8.2) or references to it and details of where it can be accessed;

(h) As-built drawings (see 8.4.1) or references to them and details of where they can be accessed;

(i) Schedule of what is interconnected with the fire alarm system; and

(j) List of all deficiencies found during the inspection and how they were resolved.

The required certificate of compliance is included in Appendix N. The certificate of compliance shall be held with other documents (see section 8).

This inspection and certification requirement shall also apply to extensions to systems where additional zones are added or the zone control unit is upgraded or replaced, except for minor works as described in 5.5.5.

NOTE – For a system extension the certificate will cover only those parts that have been added or upgraded. Per 1.8 the complete system is thereby 'deemed to comply'.

5.5.2 Confirmation Testing

5.5.2.1 General

Accredited inspection body inspection and testing shall include the following:

(a) Review of the commissioning documentation specified in 8.3.1;

(b) Sample testing in each zone, for each type of detector installed, to validate the results of the commissioning checks (5.1 to 5.4);

(c) Checks of location and spacing for all devices and equipment in accordance with sections 3 and 4; and

(d) A general inspection to confirm that installation has been completed and that the system functions as per the declared functional requirements.

5.5.2.2 Inspection and testing schedule

As a minimum, the following shall be tested or checked by the accredited inspection body (insofar as they are applicable to the installed system) to confirm correct operation, function, and indication:

(a) At least one manual call point per zone;

(b) At least one device per zone of:

  (i) Point-type smoke detectors, using an appropriate test smoke, and

  (ii) Point-type heat detectors, by applying a safe heat source;

(c) All beam-type smoke detectors;

(d) All aspirating smoke detectors;

(e) All line-type heat detectors;

(f) All specialist detectors, as per the manufacturer's testing instructions;

(g) Alerting sound pressure levels:

(i) Throughout the building noting the high and low SPL readings for a representative sample of areas, and

(ii) At a representative sample of bedheads (or approximate location if not yet installed) noting the reading for each;

NOTE – for Type 5 systems, the local alerting tone should be used unless testing shows the global evacuation signal to be quieter.

(h) VAD coverage and visibility generally comply with the design criteria;

(i) For each Type 5 local zone (household unit or suite) that:

(i) The local hush facility operates correctly

(ii) Point-type heat detectors trigger a global evacuation and indicate correctly, and

(iii) Local smoke detectors operate the correct local alerting tone;

(j) A short on any cable that serves more than one zone does not affect more than one zone;

(k) Signalling to the remote receiving centre, using the system's test facilities;

(l) Confirmation, on an audit sample basis, of any other items detailed in the commissioning documentation;

(m) Physical testing (as witness), or review of independent testing reports, of ancillary services interfaces per 5.4.3; and

(n) Confirm the presence of a suitable system logbook (see 8.5.2).

NOTE – As a general duty of care, any deficiencies identified by the accredited inspection body outside of areas of direct testing or certification should also be brought to the attention of the installer or building owner, as applicable. A typical example is where a system extension is being inspected, but deficiencies are noted in other parts of the system.

5.5.2.3 Escalation of testing

Where incorrectly indicating, incorrectly programmed, or incorrectly configured devices are found, additional testing shall be undertaken as necessary to determine the extent of the issue.

If changes are needed to the location, programming, or configuration of what the accredited inspection body considers to be an unacceptable number of devices the installer might, at the discretion of the accredited inspection body, be required to retest and recommission the entire system.

Where any of the following deficiencies are identified during inspection and testing, they shall be reinspected in person by the accredited inspection body following rectification:

(a) Alerting does not meet minimum SPL or visibility requirements;

(b) Any beam-type or aspirating smoke or line-type heat detector fails to operate;

(c) Areas are missing more than one detector;

(d) More than one detector fails to operate when tested;

(e) Areas where two-third spacing of 4.5.3(d) has been missed or spacing of more than one device is incorrect;

(f) More than one zone is affected during short circuit isolator testing;

(g) Multiple incorrect zone indications are noted; or

(h) Any other items that, in the inspector's opinion, affect the correct operation of the system.

NOTE – Video evidence might be acceptable, at the discretion of the accredited inspection body.

The rectification of minor deficiencies not significantly affecting the overall operation of the system may be confirmed by way of photographic evidence or a formal written statement provided by the installer, as appropriate.

5.5.3 Extensions and alterations

Testing of system extensions and alterations shall follow the testing requirements of 5.5.2 on an 'as near as reasonably practicable' basis noting that system compliance requirements may be to a mix of older standards. Testing need only be conducted in the area of change.

5.5.4 Zone control unit upgrade or replacement

Where a zone control unit is replaced or upgraded:

(a) Every zone and device type shall be tested for correct operation and indication;

(b) Testing shall be conducted as per 5.5.2 on an 'as near as reasonably practicable' basis; and

(c) There is no requirement to upgrade existing field cabling, devices, zones, alerting, or monitoring to the latest standard.

5.5.5 Minor works

5.5.5.1

Minor rectification works identified during annual testing or routine maintenance do not require re-inspection or re-certification by an accredited inspection body. In such cases a declaration of completion by the installer (Appendix M), accompanied by the required supporting documentation, shall be provided to the owner and appropriate records shall be added to the system logbook.

Examples of such minor works include, but are not limited to:

(a) Like for like service replacement of field devices;

(b) Replacement of corroded devices with suitably ingress protected (IP) rated equivalent devices (no limit on numbers);

(c) The addition of up to five devices where minor building changes are identified, and additional detection and alerting is necessary to maintain compliance with the standard of installation;

(d) Replacement of batteries;

(e) Replacement of a damaged control board with no site-specific configuration change; or

(f) Relocation of up to 20 detectors due to building or tenancy fit-out changes.

5.5.5.2

Re-inspection or re-certification by an accredited inspection body is not required for minor building works carried out under a building consent where fewer than 20 devices are added or relocated. In such cases a declaration of completion by the installer (Appendix M), accompanied by the required supporting documentation, shall be provided to the BCA and appropriate records shall be added to the system logbook.

5.5.5.3

In all cases, sufficient recommissioning testing shall be carried out as per the requirements of 5.1 to 5.4, as applicable, to ensure the ongoing integrity of the system. Testing records shall be kept.

5.6 System passwords

If a fire alarm system has a configurable password facility, the password(s) shall be changed from the system manufacturer's default settings once commissioning is completed, to prevent unauthorised programming changes. Such passwords are the property of the building owner and shall be provided, on request, to the building owner or any other party authorised by the building owner.

5.7 System details plate

After certification, an engraved (or equivalently durable) system details plate shall be permanently affixed to the outside of the door of the control unit and shall display all of the following information in plain lettering not less than 4 mm and not more than 7 mm in height:

(a) System type (see Appendix B);

(b) Year of installation;

(c) Applicable installation standard(s) and year; and

(d) Accredited inspection body that certified and their unique system identifier (for example, file reference).

6 MAINTAINING SYSTEMS IN COMPLIANCE AND GOOD WORKING ORDER

6.1 General

6.1.1

Fire alarm systems shall be maintained in compliance with this standard and in good working order at all times.

6.1.2

Tests, inspections, other routine maintenance, and reporting specified in this section shall be carried out at the intervals specified. Deficiencies identified by such work shall be remedied in a timely manner (see 6.1.3).

NOTE –

(1) For some systems, the compliance schedule may specify intervals different from those specified in this standard.

(2) This standard does not specify any particular tolerances for testing intervals. The underlying requirement is for 12 sets of 'monthly' checks and tests and one set of 'annual' checks and tests to be conducted in the interval between (fixed) Compliance Schedule anniversary dates.

6.1.3 Deficiencies and remedial action

6.1.3.1

Any defect or previously unnotified isolate warnings generated by the fire alarm system shall be immediately investigated and remedial action implemented as appropriate. See section 7 for details of the precautions to be taken.

In order to issue a Form 12A Certificate of Compliance for the specified system, the contractor shall be satisfied that the system is performing, and will continue to perform, in accordance with the standard or specification to which it was installed. All deficiencies shall be rectified in a timely manner taking account of the probability and degree to which the deficiency will adversely affect system performance.

NOTE – A Form 12A is not the same as an Appendix N Certificate of Compliance, issued at system commissioning.

6.1.3.2

Significant deficiencies which would lead to a probability of system failure should be urgently attended to, to ensure that the system will operate reliably. Examples of such deficiencies include, but are not limited to:

(a) Missing or faulty detectors or manual call points;

(b) Isolation of any detector or alerting device that has been in place for more than 60 days, unless part of consented building works;

(c) Widespread issues with audible or visual alerting;

(d) Batteries or power supplies undersized by more than 5%;

(e) Deficiencies that would significantly delay the operation of the system in the event of a fire; or

(f) Any minor deficiency (see 6.1.3.3) that was identified in the previous annual test and has not been remediated.

A Form 12A should not be issued if any such deficiencies exist.

6.1.3.3

Minor deficiencies which are in the process of being rectified should not preclude the ability to issue a Form 12A. Examples of such deficiencies include, but are not limited to:

(a) Areas with individual detectors out of rule;

(b) Small areas with alerting device audibility no more than 3 dB below requirements;

(c) A zone index that requires updating but is not misleading;

(d) Labelling issues; or

(e) Any other items out of compliance with the applicable Standard of installation but not considered critical to the overall working of the system.

6.1.4

Fire alarm systems which are in 'Fire' alarm condition shall be restored to normal as soon as possible following completion of appropriate checks and servicing functions to ensure the system remains in good working order.

6.1.5

To ensure that the foregoing will occur, there shall be at all times a suitable contract in force that will ensure the regular, and in emergency prompt, attendance of personnel who are competent and qualified. (See 1.10).

The name of the service provider and a 24-hour contact number shall be affixed on or adjacent to the main indicating unit, but not on the index. This shall be readily changeable in the event of a service provider change.

Where the actions described in 6.1.1 to 6.1.4 are performed by appropriately qualified persons, then the requirements of this section of the standard are deemed to have been met.

NOTE –

(1) The routine 'inspections' of this section (performed by a contractor) are not the same as the 'inspection' of Appendix N (performed by an Accredited Inspection Body in accordance with 5.5).

(2) The Building Act requires that a 'specified system' is inspected and maintained to ensure it performs, and continues to perform, to the original installation standard. As life cycle replacement of components occurs, or new failure modes become apparent, and so on, the testing, maintenance, and inspection requirements from later standards may need to be applied to ensure the level of performance at the time of original design and installation can continue to be met.

6.2 Monthly checks and tests

6.2.1

Monthly checks and tests shall be carried out as specified in this section by an appropriately qualified person as defined in 6.1.5.

6.2.2 Battery testing

6.2.2.1

The float voltage across any rechargeable battery shall be checked to ensure that the voltage per cell is maintained within the limits listed in 2.12.5.

6.2.2.2

Where appropriate, the specific gravity and electrolyte level of each cell of any rechargeable battery shall be checked to ensure that it is correct. The voltage of any non-rechargeable cell shall be checked to ensure it is above the defect warning level specified in 2.8.1(a).

6.2.2.3

The battery cabinet and battery terminals shall be checked to ensure they are maintained in a clean serviceable condition.

6.2.2.4

The battery shall be load tested for 10 s at a current not less than one-fifth of the battery's Ah rating and not more than the battery's Ah rating. During this test the battery voltage shall not fall below 80% of its nominal voltage. The battery under test shall not receive any assistance from any other power source.

NOTE – For example, the required load test for a 7 Ah battery is between 1.4 A and 7 A.

6.2.2.5

Each battery shall be marked with its installation date and any battery that exceeds the service life specified by its manufacturer shall be replaced. This requirement includes all batteries of wireless technology devices fitted to the system.

6.2.3

Correct operation of the system, including all indicators, shall be tested by using the test facilities in zone circuits with the system in the test or isolate mode. The system shall be reset to normal after completion of the tests. The alerting devices shall be tested to ascertain they operate satisfactorily, as witnessed from the control unit.

NOTE – An acceptable method of testing the alerting devices is where the evacuation switch is operated at a set time and wardens in each zone report alerting devices that do not operate. During this test, the system may give a defect warning signal.

6.2.4

Where such facilities are present, wireless device status history should be reviewed to identify any of the following conditions: lost communications, low signal strength, battery warnings, and device tampers.

6.2.5

The correct operation of all manual call points with normally open switch contacts (for example, wireless or explosive atmosphere equipment) shall be checked in situ.

6.2.6

Where connected to a remote receiving centre, and with the system in the appropriate test mode, a test of the device for signalling shall be made to ensure that the correct signals are generated and received.

6.2.7

Where any impairment notice (see Appendix P) is present this shall be noted in the test report. Where such notice(s) have been present for more than 60 days, or have passed the expected date of reinstatement, this shall be reported as a significant deficiency (see 6.1.3.2).

6.2.8

A test report shall be completed, and the results entered in the system logbook. The report shall be copied, on request, to the owner and to any authority or agency required to receive one.

Where logging of such tests is performed electronically and stored off-site, a notice with the following minimum information shall be maintained at the control unit:

(a) Name and contact details of the service provider;

(b) Date of test;

(c) Name of tester; and

(d) Details of any faults found.

This notice need contain information only for the most recent test performed.

6.3 Annual checks and tests

6.3.1

Annual checks and tests shall be as in 6.2, and additionally as specified in this section.

6.3.2

The warning facilities shall be checked to ensure they are operating correctly for all the following conditions:

(a) Failure or disconnection of the battery;

(b) Failure or disconnection of the leads to a detector or manual call point; and

(c) Absence of any plug-in zone circuit board.

6.3.3

The operation of all manual call points shall be tested in situ.

Automatic fire detectors shall be tested according to the following process:

(a) A minimum of 5% of the point-type heat detectors shall be sample tested in situ by applying a safe heat source to the detectors. If any detector fails to operate, a further sample of 10% of all detectors shall be heat tested. If a further failure occurs, 100% of the detectors shall be inspected to determine the cause of the failure or identify other potentially defective detectors or both (see also

Figure 5). Appropriate remedial action shall be carried out to all affected detectors. Any detectors destroyed during these tests (for example, eutectic alloy type) shall be replaced using types of current manufacture and compatible with the system;

(b) All line-type heat detectors shall be tested in situ by applying a short circuit at the end farthest from the control unit, or otherwise in accordance with the detector manufacturer's instructions where a short circuit test is not applicable to the device technology;

(c) A minimum of 20% of the point-type smoke detectors shall be sample tested by checking their sensitivity using one of the methods specified in 6.3.4. These detectors shall then be cleaned in accordance with the manufacturer's instructions for routine maintenance and given an in-situ test by applying test smoke, or other phenomena that directly simulate the fire products being detected. If any detector fails to operate, or fails the sensitivity check of 6.3.4, a further sample of at least 40% of all detectors shall be tested. If a further failure occurs, 100% of the detectors shall be inspected to determine the cause of failure or identify other potentially defective detectors or both (see also Figure 6). Where a smoke detector is able to signal a maintenance request when its calibration or sensitivity falls outside the manufacturer's recommended limits, the requirements for cleaning above may be omitted providing the smoke entry of the detector is externally clean;

(d) The operation of all linear beam smoke detectors shall be tested in situ in accordance with the detector manufacturer's instructions;

(e) The operation of all aspirating smoke detectors shall be tested. At least 20% of sampling points shall be given an in-situ test as in 6.3.3(c);

(f) Other detector types (for example, flame, CO) shall be tested by means appropriate to that detector type;

(g) All detectors and sampling points in the system shall be tested in rotation. A log shall be kept detailing the tested detectors and sampling points to ensure that all detectors and sampling points are systematically tested; and

(h) A minimum of one detector per zone shall be tested.

Any in-situ test shall be of a simple 'go/no go' nature and shall check that both the device and control unit operate correctly.

Components with finite life (for example, carbon monoxide detectors) that have reached the end of their manufacturer's specified service life shall be replaced or refurbished.

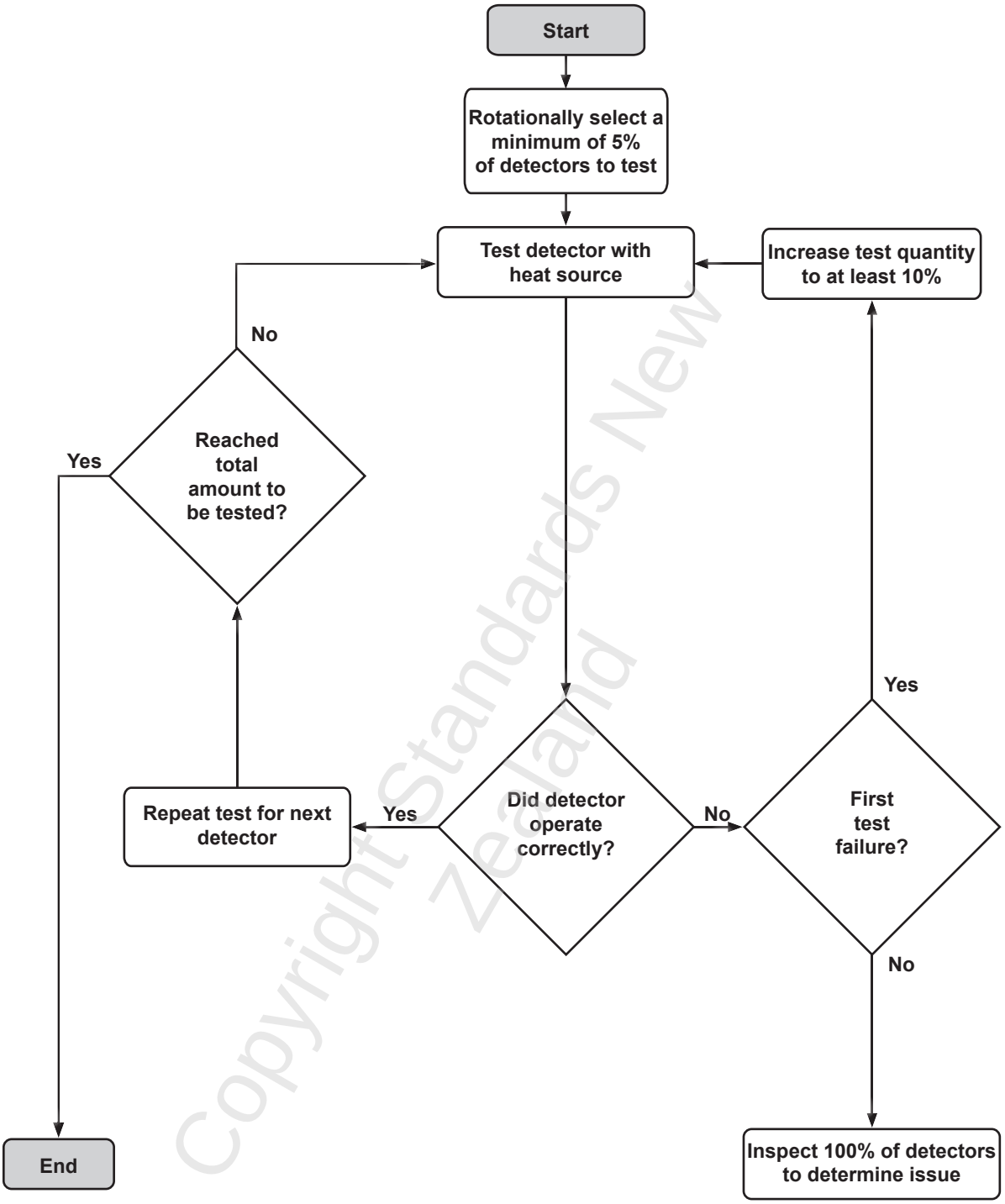


Figure 5 – Heat detector annual sample testing flow chart

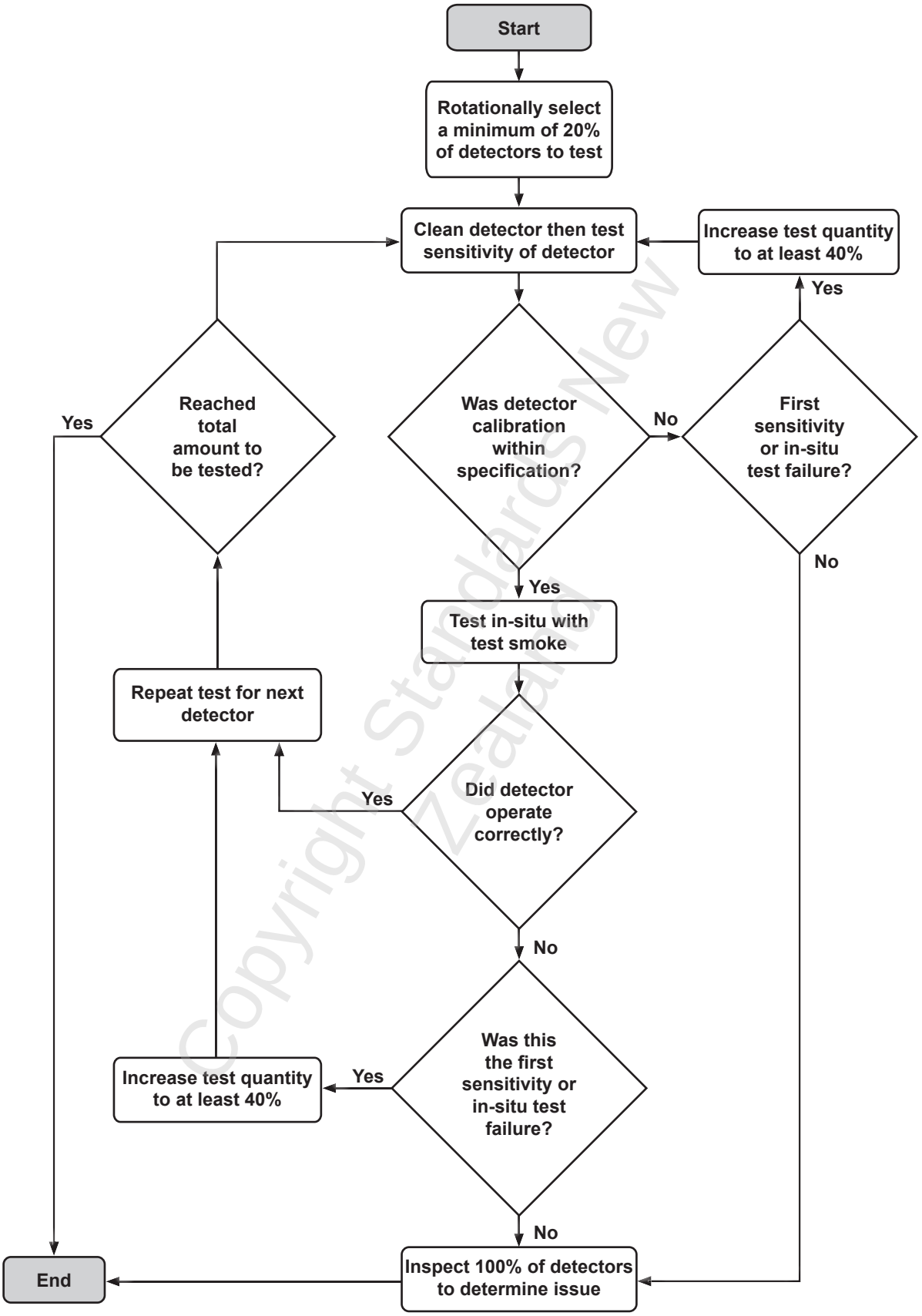


Figure 6 – Smoke detector annual sample testing flow chart

6.3.4

Sensitivity checking of point-type smoke detectors (see 6.3.3(c)) shall be carried out using one of the following methods, as appropriate for the detector type:

(a) Manufacturer's sensitivity test instrument;

(b) Equipment specifically designed for sensitivity checking and meeting the requirements of AS 1851;

(c) Confirmation at the control unit; or

(d) Other method as specified by the detector manufacturer.

These checks shall confirm that the detector's sensitivity is within the manufacturer's specified operating limits.

If sensitivity tests are not possible then detectors shall be replaced every 10 years.

6.3.5

The operation of each zone circuit from either the end of line device, or the most remote detector or manual call point, to the output of the control unit signalling device shall be checked.

6.3.6

A thorough visual examination shall be made of the general condition of all components of the system.

6.3.7

All aspirating system pipework shall be cleaned using alternating vacuum or positive pressure to remove internal dust build-up. All aspirating smoke detector filters shall be cleaned or replaced as per manufacturer's instructions.

NOTE – In dirty environments this may need to be performed more often.

6.3.8

The entire premises shall be checked to ensure that all areas are protected and that any building alterations, or changes in usage of any area, have not reduced the effectiveness of the system.

6.3.9

Legends shall be checked to ensure that they are still current and that they clearly indicate their function at a viewing distance of 2 m. Zone and status indicators shall be checked to ensure correct operation. Where analogue addressable devices are used, alphanumeric display descriptions shall be checked for accuracy during the tests described in 6.3.3 for all devices tested.

6.3.10

The correct operation and function of the defect warning facilities shall be checked by simulating the applicable conditions in accordance with 2.8.1.

NOTE – Tests for defect conditions 2.8.1(k), (l), and (m) may be omitted if the equipment does not allow practical field testing of these conditions.

6.3.11

The interface between the fire alarm system and any ancillary service forming part of the building's overall fire safety system (such as smoke control system, lift override, door hold-open devices, personal alerting devices) shall be checked.

NOTE – This test should not only check that an interface relay has operated but also that there is an appropriate functional response from the ancillary equipment connected via the relay. Any detailed functionality of ancillary equipment that operates as a result of the fire alarm operation needs to be checked by the service provider who maintains the ancillary devices, as these devices or equipment are likely to be a separate compliance schedule item. See the Fire Protection Association NZ Code of Practice for Integrated Building Systems (in preparation) for further recommendations on integrated end-to-end testing of ancillary services interfaces.

6.3.12

The circuit wiring external to the control unit shall be tested, using the test method specified by the system manufacturer, to ensure it is isolated from the building earth.

6.3.13

Initiation of a fire alarm within 60/90/120 s of the introduction of suitable test smoke or gas into the penultimate hole of each branch of an aspirating sampling network shall be checked.

NOTE –

(1) The maximum transport time for AS 1603.8 detectors is 90 s. For AS 7240.20 or ISO 7240-20 detectors, the maximum transport time is 60 s (Class A), 90 s (Class B), or 120 s (Class C).

(2) The permitted equipment response time of 2.4.6 is additional.

6.3.14

Testing and inspection shall be carried out to ensure the correct operation of all alerting devices and that the building is adequately covered as defined in 4.6.3 and 4.6.4, including the SPL at every bedhead. Tests and results shall be recorded in sufficient detail to identify what was tested and what the result was.

Checks shall be carried out to ensure that the Type 5 local smoke detection, alerting, and hush facilities perform correctly in all household units and suites.

Testing shall be carried out to ensure the correct operation of all fire microphones.

Visual alerting devices shall be tested for correct operation and visibility from all normally accessible areas where they are required, and that synchronisation occurs where the signals from multiple units can be viewed from a single location.

Where indirect viewing of visual alerting devices is necessary the colour and condition of surfaces shall be checked to ensure they continue to provide adequate reflectivity.

NOTE –

(1) For an open area that meets all the SPL requirements, it is sufficient to record the name of the area and the maximum and minimum readings observed in the area.

(2) For bedheads, the test results need to be recorded separately for each bedhead.

(3) Where the measurement of light output is impractical, a visual inspection should be ➤

conducted to determine acceptable perception. It is sufficient to record the name of the area and that visual perception was acceptable.

(4) It is recommended that audible alerting devices are silenced during testing of the visual alerting devices (for example, by temporary disconnection of the amplifier output).

(5) The annual test and inspection described may be combined with any mandatory trial evacuation tests (for example, as required by the Fire and Emergency New Zealand (Fire Safety, Fire Procedures, and Evacuation schemes) Regulations 2018).

6.3.15

Where wireless devices are installed, a full site radio frequency (RF) survey shall be conducted using equipment and procedures recommended by the wireless detection system manufacturer.

The RF site survey shall comprise all of the following:

(a) Confirm that the wireless signal has not been compromised by any on-site changes;

(b) Identify areas of poor wireless signal strength;

(c) Identify any sources of wireless signal interference; and

(d) Identify any requirements for additional wireless transmitters/receivers or signal boosters.

6.3.16

A test report shall be completed which records the following:

(a) Name and contact details of the service provider;

(b) Date of test;

(c) Name of tester;

(d) The results of all tests and inspections;

(e) A list of non-complying features; and

(f) Corrective measures necessary to return the system to compliance with this standard.

Recommendations for maintenance and a general appraisal of the system's condition shall also be included.

The report shall be copied to the owner, with a copy lodged as required by any compliance schedule issued in respect of the Building Act.

6.4 Emergency warning and intercommunication systems (EWIS) – Additional requirements

The checks and tests as specified in 6.1 to 6.3 inclusive shall be carried out for EWIS where applicable, and in addition, the checks and tests specified in AS 1851, as applicable, shall be undertaken.

7 PRECAUTIONS TO BE TAKEN WHEN A FIRE ALARM IS RENDERED INOPERATIVE

7.1 General

This section provides minimum precautions for parties involved in the shutdown of fire protection systems. All work and communications shall, in addition to the requirements here, meet all requirements of the Health and Safety at Work Act.

Fire alarms may be rendered temporarily inoperative from time to time to effect maintenance, repairs, or alterations, or they may be permanently disabled. Before isolating or disabling a fire alarm system the contractor shall follow the precautions specified in this section, as well as others required by the building owner or insurer.

NOTE –

(1) Where the system being isolated is a necessary part of the fire safety requirements for the building under a building consent, the building should not be occupied in the affected areas during the period of isolation unless compensatory fire precautions are taken.

(2) Such precautions may also be appropriate for situations where a building consent is not required.

(3) Appendix P provides forms and notices to ensure the notification and authorisation of all isolations, and to guide the process of escalation and reinstatement.

7.2 Risk assessment

7.2.1 Contributors to risk assessment

A full risk assessment shall be undertaken. Fire alarm systems shall not be isolated or rendered inoperative overnight in buildings that contain sleeping accommodation without giving at least 24 hours' notice to the building owner, building occupier, fire brigade, and the building insurers.

All parties involved in the shutdown should consider the life safety implications on workers, occupants, and overall building fire and life safety provisions. Amongst others, the risk assessment may need to include input and agreement from:

(a) The fire brigade;

(b) The building owner(s) and occupier(s); and

(c) The building owner's risk consultants/insurers

7.2.2 Risk mitigation

Where systems are required to be rendered inoperative and/or parts of the system isolated for extended durations or overnight in buildings that contain sleeping accommodation, treatment and care, or similar facilities, adequate mitigating measures should be implemented before the isolation and the identified risks should be regularly reassessed.

7.3 Notification

7.3.1 Notification period

Notification shall be delivered at least 24 hours before the start of work that will isolate or render the fire alarm system inoperative. If an emergency compels immediate action to render the system inoperative, notification shall be given as soon as possible thereafter.

7.3.2 Oral notification

Oral notification of the extent and effect of the impairment shall be given to the authorised representative of the owner or occupier, or person in charge of the building.

Oral notification shall be confirmed promptly in writing.

7.3.3 Notification form

Notification to the owner shall be given on a notification and authorisation form, a sample of which is provided in Figure P1 ('Form P1'). This form also gives precautions that the owner should take during the period the alarm system is inoperative and records their authorisation for the work to proceed.

7.3.4 System impairment notice

Where the alarm system is rendered inoperative, in whole or in part, the notice in Figure P2 ('Notice P2') or Figure P3 ('Notice P3') shall also be used to identify the presence and extent of all system impairments. This notice shall be completed by the contractor at the time of isolation or impairment and affixed to the main control or indicating unit. The notice shall remain in place until the whole system is restored or the notice is replaced with a new notice upon its expiry prior to system restoration being completed.

7.4 Permanent disconnection

The contractor shall notify the relevant authorities, including Fire and Emergency New Zealand and the TA or BCA in writing, using Form P1, when an alarm system is to be rendered permanently inoperative.

7.5 Authorisation

Except in emergency, the system shall not be rendered inoperative, either in whole or in part, until the owner or the owner's representative has authorised the work by approving in writing (physical or electronic) using the notification and authorisation Form P1.

7.6 Resolution

All practical measures should be taken to resolve issues of system impairment in a timely manner.

All impairment notices shall be reported as deficiencies during monthly and annual testing (see 6.2.7), and impairments fitting any of the following criteria shall be escalated to a serious impairment Notice P3, which shall be reauthorised by the building owner or occupier, or person in charge of the building, using Form P1:

(a) Impairments affecting more than one zone, or 10% of the entire system;

(b) Impairments that have been in place for more than 60 days (not part of consented building works) or have passed the expected date of reinstatement, whichever occurs first;

(c) Impairments affecting alerting devices in any occupied area of the building; or

(d) Impairments affecting smoke detection in any sleeping space or escape path from a sleeping space in the building.

Significant impairments such as these may preclude the issuing a Form 12A (see also 6.1.3.2).

8 SYSTEM DOCUMENTATION AND RECORDS

8.1 General

System design, commissioning, testing, and maintenance documents and records as detailed in 8.2, 8.3, 8.4, and 8.5 shall be provided, maintained, and updated for each system. These documents shall be readily available to the building owner and their authorised representatives.

NOTE – Where appropriate for the site, hard copy documentation should also be considered and maintained with operation and maintenance manuals for other building systems.

8.2 Design documentation

Design information shall include the following, as applicable to the consented design:

(a) Building consent details (number, date of issue);

(b) Consented fire report;

(c) Consented fire protection specification (if available);

(d) Power supply and battery calculations;

(e) Amplifier size and loudspeaker loading calculations;

(f) Other alerting device calculations (loading, visibility);

(g) Cause-and-effect matrix;

(h) Hard and soft copies of the site-specific configuration;

(i) Aspirating smoke detection design calculations;

(j) Wireless detection design documentation; and

(k) Details of any other specialist detection or functionality.

If alterations, extensions, or replacements are required after initial commissioning it is the responsibility of the installer to make themselves familiar with the original system design criteria (fire strategy), to ensure that alterations, additions, or replacements follow the same fire strategy.

8.3 Commissioning documentation

8.3.1 Commissioning documentation for initial installation

The following commissioning documentation shall be provided to the accredited inspection body as validation of the system's final design:

(a) Building consent details (number, date of issue);

(b) Consented fire report;

(c) Consented fire protection specification (if available);

(d) Design information (see 8.2); and

(e) Commissioning records (see 8.4.1).

8.3.2 Commissioning documentation for alterations/extensions and control unit upgrade/replacement

In the case of system upgrades and extensions, where original documentation is incomplete, compliance with the documentation requirements of 8.2 and 8.3.1 shall be on an as near as reasonably practicable basis, depending on the level of existing system documentation available.

Documentation (see 8.4.2) shall fully detail any changes and additions but does not need to completely document the existing system.

Checks and calculations shall be performed and documented to confirm that the final power supply capacity, battery sizing, and alerting circuits are capable of supplying their required full loads.

This documentation shall be added to the system commissioning documentation.

8.4 Commissioning records

8.4.1 Initial commissioning records

It is the responsibility of the installer to make themselves familiar with the system design criteria (fire strategy), when implementing a consented design.

Commissioning records and as-built drawings shall include but not be limited to the following, as applicable to the installed system:

(a) System schematic;

(b) As-installed system layout (building plans) showing:

  (i) Control and indicating unit locations, make, and model

  (ii) EWIS and supplementary detection system locations, make, and model

  (iii) Detection and alerting zone designations and demarcations

  (iv) Field device and equipment locations, including type, make. model, and designation (see 4.2.12)

  (v) End of line and line-type heat detector load resistor locations, and

  (vi) Cabling routes (this may be indicative of route between devices but shall reflect the true sequence of wiring);

(c) Details of interfaces with other systems and their locations, make, and model;

(d) Control and indicating unit layout and termination schedules (see 4.2.13);

(e) Junction box and remote cabinet wiring termination schedules (see 4.2.13);

(f) Details of site-specific system configuration;

(g) Fire brigade approval of indicating and control unit locations, and index diagram (see 4.2.9.2, 4.3.1.1, and 4.3.2(a));

(h) Confirmation of remote connection (if applicable);

(i) Completed installer's declaration of completion (see Appendix M);

(j) Commissioning results from examinations and tests performed in 5.2, 5.3 and 5.4; and

(k) Wireless detection RF site survey and commissioning report (see 4.8.3 and 5.4.4).

NOTE – SAA HB 20 is recommended for use as a source of symbols used in layout and interconnection drawings.

8.4.2 Commissioning records for alterations or extensions and other system changes

A register of all changes made to the system after initial commissioning shall be maintained. This shall include all the following information:

(a) Firmware version number;

(b) Date and time of change;

(c) Name of company and technician;

(d) Brief description of changes made;

(e) Details of site-specific system configuration after the changes;

(f) Updated as-built drawings (see 8.4.1);

(g) Completed installer's declaration of completion (see Appendix M);

(h) Commissioning results from examinations and tests performed in 5.2, 5.3 and 5.4; and

(i) Wireless detection RF site survey and commissioning report (see 4.8.3 and 5.4.4).

Records of the alteration commissioning testing, to confirm correct operation, shall be added to the system commissioning records.

After each such change, a copy of the new system configuration shall be added to the system commissioning records.

8.5 Testing and maintenance records

8.5.1 General

A copy of the most recent site-specific configuration on record shall be made available to any contractor or person the building owner authorises.

All test records, whether paper or electronic, shall be securely stored by the testing contractor and made available to the building owner and their authorised representatives for not less than 7 years, irrespective of who the current testing contractor is.

Where electronic recording of tests is conducted a copy of the test results and any deficiencies noted shall be forwarded to the building owner and/or their authorised representatives.

8.5.2 System logbook

A system logbook shall be maintained at the fire alarm system control unit detailing all of the following:

(a) Date and time of any defect or fire call-out or routine maintenance;

(b) Reason for call-out or system attendance;

(c) Technician's name and company;

(d) Brief description of remedial work done;

(e) Brief description of maintenance work done;

(f) Details of site-specific system configuration changes (see 8.4.2);

(g) Results of monthly tests (see 8.5.3);

(h) Battery replacements and replacement schedules (see 6.2.2.5); and

(i) Records of annual detector sample testing and rotational testing schedules (see 6.3.3(g)).

8.5.3 Monthly test records

The results (see 6.2.8) of monthly tests conducted as specified by 6.2 and the building's compliance schedule shall be entered in the system logbook.

8.5.4 Annual test records

The results (see 6.3.16) of annual test conducted as specified by 6.3 and the building's compliance schedule shall be recorded either manually or electronically, this shall include a list of any deficiencies found.

At each annual test, a copy of the current system configuration shall be added to the system commissioning documentation.

APPENDIX A – SIGNALLING TO A REMOTE RECEIVING CENTRE

(Normative)

A1 Types of connection

The need for signal transmission ('connection') to a remote receiving centre should be determined by reference to the declared functional requirements of the system (see 1.6), and connection will be required as detailed in Table A1.

Table A1 – Acceptable remote connection types

Declared functional requirement	Acceptable type of remote receiving centre	
	Fire and Emergency NZ	Other
(a) To transmit an alarm to summon Fire and Emergency NZ assistance – as per 1.6(a)	Yes	No
(b) To transmit an alarm to summon some other specified emergency fire-related assistance – as per 1.6(f)	No	Yes
(c) To monitor and signal to a remote location the presence of faults – as per 1.6(b), where:		
1.6(a) applies – as in (a) above	Yes	No
1.6(f) applies – as in (b) above but NOT (a)	No	Yes

NOTE – Attention is drawn to the requirement of 1.4 for the remote receiving centre, irrespective of type, to take immediate action in response to fire alarm or other off-normal signals received.

A2 Means of connection

Signalling to a remote receiving centre shall be achieved by:

(a) A dedicated signal path from each control unit;

(b) A signal path common to more than one control unit; or

(c) An alarm transport system.

NOTE – In all cases, the characteristics of the receiving equipment need to be established.

A3 Functional requirements

A3.1

Each stand-alone control unit shall be connected to a co-located or integral transmitting device which shall communicate continuously with the remote receiving equipment.

A3.2

Where multiple control units are networked together:

(a) The coverage of any control unit shall not exceed the limits specified in 4.1.1;

(b) All alarm conditions for a sector shall be viewable from all indicating units relating to that sector; and

(c) All brigade controls for a sector shall be provided at all indicating units relating to that sector.

A3.3

Each sector shall be separately identifiable by the fire brigade alarm transport system.

A3.4

The ability of the transmitting device to transmit a signal shall not be dependent on the energy supply from the control unit.

A3.5

Where the transmitting device cannot be powered from the remote receiving equipment, a separate supply shall be provided. This separate supply shall be integrated with the transmitting device and shall have the capacity to ensure that a defect signal can be transmitted on complete failure of the electrical supply to the control unit.

A3.6

The separate supply shall be supervised to give a defect warning as required by this standard.

A3.7

Failure of the communications link between the transmitting device and the remote receiving centre shall not result in a fire signal at the receiving centre.

A3.8

Failure of the communications link between the transmitting device and the remote receiving centre unit shall result in an appropriate signal at the receiving centre.

A3.9

Irrespective of the type of remote receiving centre, in addition to the requirements of A1 to A3, the following shall also be complied with: 2.4.12, 2.5.4, 2.8.2, 2.9, and 6.2.6.

A4 Sector indicating unit

A4.1

Where multiple control units are located in one building or on one site, a sector indicating unit may be required by the fire brigade at the attendance point.

A4.2

The location of the individual control units relative to the usual viewing position of the sector indicating unit shall be clearly defined on the sector indicating unit (see Figure A1).

A4.3

Where both sector and zone indicators are provided on one unit, clear differentiation shall be made between the two functions.

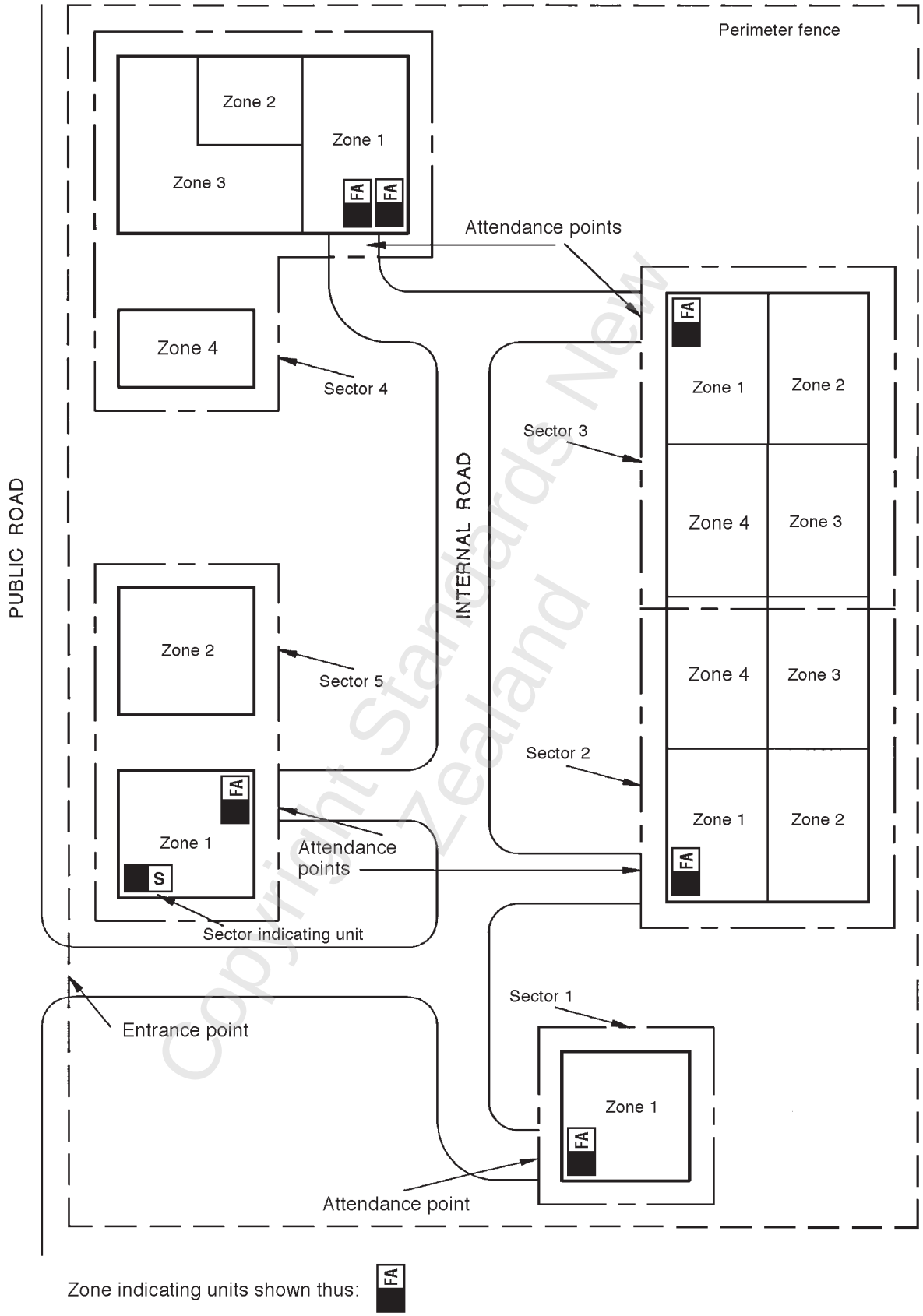


Figure A1 – Example layout of zones and sectors

A4.4

The sector indicating unit needs to provide fire indication only.

A4.5

No sector indicating unit is required if all zone indicating units are co-located.

A4.6

The sector indicating unit shall be located near the main entrance point so that, in order to reach a control unit, the fire appliance is not required to return along roads already traversed.

A4.7

If there is more than one main entrance point, it may be necessary to have repeating sector indicating units located at the other main entrance points.

A4.8

Sector indicating units are not required to have a separate connection to the remote receiving centre. Their defect signal may be conveyed via a zone control unit.

A5 Power supplies

A5.1

The power supply for sector indicating units shall meet the requirements of 2.11, 2.12, 2.13, and 4.3.4.

A5.2

The sector indicating unit may share a power supply with repeating sector indicating units but shall not share a power supply with any other control units.

A6 Installation

A6.1

The installation of sector indicating units shall meet the requirements of section 4 as applicable.

A6.2

All zones shall be included in the designation of sectors.

A7 Commissioning

A7.1

The commissioning of sector indicating units shall meet the requirements of section 5 as applicable.

A7.2

Checks shall also be made that sector indicating units have been located correctly in relation to the fire brigade attendance points and that sectors have been correctly designated.

A8 Regular inspection and testing

A8.1

The inspection and testing of sector indicating units shall meet the requirements of section 6 as applicable.

A8.2

The sector indicating units shall be tested to ensure correct operation.

APPENDIX B – TYPES OF FIRE SAFETY SYSTEMS

(Normative)

B1 Introduction

For the purposes of this standard, the equipment and configuration needed for the various types of fire safety systems are as follows.

B2 Type 1 – Domestic smoke alarm system

A Type 1 system involves combined smoke detector and audible alerting device(s), either hard-wired or battery powered, and which are provided with a 'hush' facility that allows an occupant to silence the alarm for a short period.

Unless a single station smoke alarm is sufficient to cover the entire household unit or suite, smoke alarms are required to be interconnected such that when smoke is detected at one device the alerting is activated at all devices.

Visual or tactile alerting (or both) is permitted to be added to the system provided the audible alerting functions are not compromised.

NOTE – Type 1 systems are not covered by this standard – see NZS 4514.

B3 Type 2 – Manual fire alarm system

A Type 2 is a fire alarm system compliant with NZS 4512 with manual call points throughout the building. It might be required by the declared functional requirements (see 1.6) to connect to a remote receiving centre. Supplementary heat, smoke, or other detectors may be included in the system.

B4 Type 3 – Automatic fire alarm system activated by heat detectors and manual call points

A Type 3 is an automatic fire alarm system compliant with NZS 4512 with full building coverage of heat detectors and manual call points and with provision for automatic signalling to a remote receiving centre.

B5 Type 4 – Automatic fire alarm system activated by smoke detectors and manual call points

A Type 4 is an automatic fire alarm system compliant with NZS 4512 with full building coverage of smoke detectors and manual call points and with provision for automatic signalling to a remote receiving centre.

If the building is not fully covered with smoke detectors but is adequately provided with manual call points, it is deemed a Type 2 with supplementary smoke detectors.

In limited circumstances, heat detectors are allowed to be substituted for smoke detectors of a Type 4 system where the ambient conditions of a space are not suitable for smoke detectors.

B6 Type 5 – Automatic fire alarm system with modified smoke detection and manual call points

A Type 5 is a variation of the Type 4 or Type 7 alarm systems requiring part of the smoke detection component to have a local alarm with audible alerting devices to warn only the occupants of single firecells containing sleeping accommodation (such as household units or suites) and the building management, where such management exists. The local smoke detection alarm is required to have a 'hush' switch facility which mutes the local alarm for a time not exceeding 2 minutes.

Type 5 is permitted only where an automatic fire alarm system activated by heat detectors (part of the main alarm system) is also installed in sleeping firecells which do not already have a Type 6 or Type 7 sprinkler system.

The local alarm component of a Type 5 system is restricted to single firecells containing sleeping accommodation in selected occupancy groups. The local alarm system is not permitted to be extended to other areas such as exitways or common spaces, which are required to retain a Type 4 smoke detection system.

This system is required to comply with NZS 4512.

B7 Type 6 – Automatic fire sprinkler system with manual call points

A Type 6 is an automatic fire sprinkler system compliant with either NZS 4541 or NZS 4515 (as modified by the NZBC Acceptable Solutions) with automatic signalling to a remote receiving centre, plus a Type 2 manual fire alarm system compliant with NZS 4512.

Activation of the fire sprinkler system will also activate the Type 2 system's alerting devices.

B8 Type 7 – Automatic fire sprinkler system with smoke detectors and manual call points

A Type 7 is an automatic fire sprinkler system compliant with either NZS 4541 or NZS 4515 (as modified by the NZBC Acceptable Solutions) with automatic signalling to a remote receiving centre plus a Type 4 smoke detection and manual fire alarm system compliant with NZS 4512.

Activation of the fire sprinkler system will also activate the Type 4 system's alerting devices.

APPENDIX C – GUIDELINES FOR ASSESSMENT OF COMPETENCE AND QUALIFICATION

(Informative)

C1 General

This appendix provides guidance for designers, installers, testers, and inspectors around some practical aspects of quality assurance for competence and qualification to certify the design, installation, and commissioning, and to perform routine testing and certification of fire alarm systems.

Underpinning these considerations is the principle that quality cannot be inspected into a system but instead needs to be built into the process that produced it.

Clause 1.10 specifies that the design, installation, commissioning, and maintenance of fire alarm systems needs to be performed competently by, or effectively supervised by, competent and appropriately qualified personnel.

Clause 1.8.1 requires, as a condition of compliance, that installation is undertaken by competent and qualified personnel.

Clause 6.1.5 requires routine testing of fire alarm systems to be performed by competent and qualified personnel.

The 'Installer's Declaration of Completion (Declaration) of Appendix M requires that system installers formally confirm the completion of the work they have undertaken and declare the qualification of system's designer. This declaration has legal standing and may be relied upon by various authorities. In case of dispute or loss, it can become subject to legal challenge.

NOTE – Design refers to the technical design of fire alarm systems to this standard. It is not intended to represent the 'fire report' design which is typically completed by a fire engineer and separately noted on the Appendix N certificate and possibly also on the building consent.

The routine testing and maintenance of fire alarm systems is covered by the legally mandated Independently Qualified Person (IQP) approval scheme. No additional assessment is required.

The design and manufacture of fire alarm equipment and components is covered by the requirements of this standard (see 1.8.1) for these to be listed, and for the listing number(s) to appear on the Certificate of Compliance (Appendix N). No additional assessment is required.

C2 NZQA qualifications for fire detection and alarms

At the time of publication, the qualifications listed below for fire detection and alarms are recognised by the New Zealand Qualifications Authority (NZQA).

For installation, commissioning, and maintenance:

(a) New Zealand Certificate in Fire Detection and Alarms (Level 4); and

(b) National Certificate in Fire Detection and Alarms (Level 4).

For testing:

(c) New Zealand Certificate in Fire Detection and Alarms (Testing) (Level 3); and

(d) National Certificate in Fire Detection and Alarms (Testing) (Level 3).

For inspection:

(e) New Zealand Certificate in Fire Protection Systems Technology (Level 4); and

(f) National Certificate in Fire Protection Systems Technology (Inspection and Testing) (Level 4).

For fire detection and alarm system design:

(g) New Zealand Certificate in Fire Detection and Alarms (Level 4); and

(h) New Zealand Diploma of Fire Engineering (Level 6).

NOTE – The above should not be considered the only suitable qualifications. They were developed in collaboration with the fire protection industry and are generally accepted as setting a minimum baseline for the expected level of qualification for industry practitioners.

C3 Individual signatory

By way of example, any individual who holds an NZQA National Certificate or New Zealand Certificate in Fire Detection and Alarms (Level 4), or equivalent, and is responsible for the overall design, installation, and commissioning of a fire alarm system (either personally, or by staff under their direct personal (on-job) supervision, or by colleagues who hold the same qualification) could reasonably be considered to be qualified to sign an Installer's Declaration of Completion (Appendix M). No additional assessment would be necessary other than routine confirmation of each person's ongoing competence.

In situations where the installation company signatory to the Declaration does not hold a relevant and recognised qualification, or has not personally performed or supervised all of the installation work being certified, it is strongly recommended that they establish documentary evidence through a robust and effective quality assurance system to show how the general requirements for competence and qualification have been met for both:

(a) Themselves; and

(b) Their supervisory relationships with those who actually performed the work.

C4 Larger organisation systems

Typically, in a larger organisation, a number of employees or members of staff (qualified, partially qualified, and unqualified) are collectively responsible for the design, installation, and commissioning of a fire alarm system. One appropriately qualified employee will sign the Installer's Declaration of Completion (Appendix M) on behalf of the company.

The company's internal systems then assume a vital role in ensuring a formal supervisory connection between the person who signs the Declaration and those who actually performed the work.

It is thus strongly recommended that these relationships, and the qualifications of the various personnel, be formally assessed and documented within the organisation's quality assurance system.

Apprentices or unqualified personnel working under the supervision of a qualified person should be regularly monitored and assessed. It would be reasonable to expect the degree of this supervision to depend on the experience and knowledge of the apprentice, and to progressively decrease as they gain experience and progress toward formal qualification.

Any contracted personnel who carry out installation work should hold suitable qualifications, have demonstrated competency, and be working under the supervision of a suitably qualified and competent person. Again, it would be reasonable to expect the degree of this supervision to depend on the experience, expertise, and knowledge of the subcontractor.

It would also be reasonable to expect that if an organisation has a quality management system certified by an accredited quality management system certification body as compliant with ISO 9001, and with a scope that includes the design, installation, and commissioning of fire alarm systems to NZS 4512, much of this documentation would already exist, or, if it did not exist, could be formally developed and controlled within such a system.

C5 Assessment of competence and qualification

Where the system designer or the person signing the Installer's Declaration of Completion (Appendix M) does not hold an appropriate NZQA qualification, then an assessment is recommended to determine equivalence.

People holding a relevant overseas qualification are encouraged to apply to NZQA for an international qualifications assessment to formally evaluate their qualification against the New Zealand requirements.

Knowledge and experience gained in New Zealand can also be formally recognised through an industry training organisation competency-based assessment process whereby individuals experienced in their trade are examined for knowledge and experience in relation to the requirements of the relevant NZQA qualification. This process includes an oral, written, and practical examination supported by site visits and evidence provided. If the assessor is satisfied that the candidate meets the requirements, the unit standards are registered with the NZQA and a formal qualification can be awarded.

In situations where neither of the above is practical, an organisation or individual needs to either self-assess or have a suitable third party assess the adequacy of both practical ('how to do it') and theoretical ('what to do') components of the qualifications and experience that the personnel designing, installing, and commissioning the system do have, in order to reasonably establish objective and practical equivalence to the baseline level of the applicable NZQA qualifications.

This assessment of equivalence should be performed taking into account a combination of typical factors such as:

(a) Relevant overseas fire alarm qualification(s);

(b) Relevant level 5 (or higher) New Zealand qualifications;

(c) Completed work towards a relevant NZQA qualification;

(d) Technical membership of a relevant New Zealand or international professional body; ➤

(e) Recent industry experience;

(f) Examples of recent successfully completed fully compliant system design work;

(g) Examples of recent successfully completed installation work, fully compliant, and accepted by an accredited inspection body;

(h) Equipment supplier training certificates;

(i) Evidence that the individual has access to and knowledge of this standard (NZS 4512) and its referenced documents;

(j) Their relative skills and experience in relation to the system being installed; and

(k) The nature of any deficiencies found in systems previously offered for inspection (in effect an individual experience rating with accredited inspection bodies).

It is recommended that any self-assessment be independently peer reviewed.

By way of specific examples:

(l) Registered or qualified electricians could reasonably be expected to have much of the 'how to do it' ability, but would need to carefully assess their adequate knowledge of, and familiarity with, design and installation to NZS 4512 plus fire alarm systems technology in particular;

(m) Registered electrical appliance service persons (formerly ESTA registered electrical service technicians) or security technicians who hold an NZQA National Certificate or New Zealand Certificate in Electronic Security (Level 4) could reasonably be expected to have much of the general 'what to do' knowledge, but would need to carefully assess their competence in and knowledge of the areas of general installation practice; knowledge of, and familiarity with, design and installation to NZS 4512; plus familiarity with fire alarm systems technology in particular.

C6 Continuing professional development (CPD)

In addition to being able to demonstrate knowledge and competency at a particular instant in time, those performing the functions listed in C1 should undertake continuing professional development (CPD).

CPD is a well-established practice whereby professionals undertake ongoing education and training in order to both maintain and improve their skills and knowledge.

CPD can take a variety of forms. The following are suggested as relevant to the activities covered by this standard (examples only, not an exhaustive list):

(a) Technical courses – certificate, diploma, or micro-credential units which revise, or update qualifications already obtained;

(b) Technical skills – workshops presented by manufacturers, industry bodies, government agencies, or recognised training providers;

(c) Industry-run CPD events – conferences, seminars, presentations, industry meetings, standards, or code of practice development;

(d) Business topics – general management, project management, supervisory and people management skills, financial planning, strategic planning, succession planning;

(e) Health and safety – legal, first aid, risk management; and

(f) Personal development – leadership, conflict resolution, communication.

It is recommended that those performing the functions listed in C1 should maintain relevance and currency by completing a minimum 16 hours of CPD activities every year. Specific qualifications or third-party accreditations may require a greater CPD commitment.

APPENDIX D – SUPPLEMENTARY DETECTORS AND SYSTEMS

(Informative)

	Category of detector or system supplementary to the main fire alarm system:		
	Supplementary (additional) detectors (see 2.4.1). For example: in-duct smoke detectors, heat detectors in lift shaft, escape route smoke detectors	**Supplementary fire alarm systems to cover a specific risk (see 4.1.7).** For example: supplementary high sensitivity smoke detection, linear heat-sensing cable, in-cabinet smoke detection, UL 300 restaurant suppression system	**Other fire protection systems (see 4.6.13).** For example: sprinkler system, gas flood system, deluge system, gas detection system, suppression system
Is full building coverage required before considering?	Yes	Yes	Yes
May the supplementary detector or system operate the main fire alarm system's alerting devices?	Optional. (Interconnection is typically via a zone circuit of the main fire alarm system). The alerting may reset automatically (see 2.4.2).	Yes. Interconnection can be either via a separate zone circuit of the main fire alarm system, or directly (as at right).	Optional. They are required to interconnect directly. The other system is required to have its own silence alarms switch (see 2.5.5). The interconnection is to be supervised by the main fire alarm (see 4.6.13).
May it operate a main fire alarm system zone indicator? **(which is required to be red, see 2.10.5.2)**	Optional. (This is strongly recommended if the detectors operate alerting devices or signal remotely).	Required. Also required to be separate	Recommended if the other system is remote connected (see 4.2.9.2(d), 2.10.5). It is recommended to have one indicator for each zone of the other system.
May the supplementary detector or system signal fire or defect remotely?	Optional. (Signals are typically conveyed via a zone circuit of the main fire alarm system).	Optional. (Signals are typically conveyed via a zone circuit of the main fire alarm system).	Optional. A Fire condition from the other system is not permitted to signal via the main fire alarm system (see 2.3.5), but some defect signals may do so (see 2.3.5 and 2.5.5).
Is a zonal relaxation permitted for the supplementary detector or system?	Not applicable.	Yes	Not applicable.
What standard is the supplementary detector or system required to comply with?	NZS 4512	NZS 4512	Whatever technical Standard is applicable to the other system. It is required to be stand-alone.

NOTE – This table is intended as a ready reference for some aspects of the relevant clauses. It is not a substitute for a full understanding of them.

APPENDIX E – SPECIFICATION FOR HEAT ACTUATED FIRE DETECTORS

(Normative)

E1 General

E1.1

This appendix specifies performance testing for electrical and electronic detectors that are actuated by heat. Alternative technologies that do not comply with the specific requirements, but give equivalent performance, are not necessarily prohibited. In such cases, appraisal testing will need to demonstrate this to the satisfaction of the relevant authority.

E1.2

Attention is drawn to the general requirements for detectors contained elsewhere in this standard. In particular, the requirement for mechanical alarm contacts to be normally closed (2.16.8), the requirement for detectors to have visual operation indication (2.16.7), and the prohibition on use of eutectic alloys for heat detection (2.16.9).

E2 Materials, design, and construction

E2.1

The selection and application of materials, and the design and construction of the detector shall ensure that, under normal conditions of installation and use, and taking into account any depreciating factors which may be reasonably anticipated, there is no risk of mechanical or electrical failure and reliability of operation is maintained.

E2.2

Detectors shall be made of corrosion resistant material, or plated, or otherwise suitably treated to resist the particular atmosphere likely to be met in service.

E2.3

The base on which live parts are mounted and the insulating material, if any, between current and non-current carrying parts shall consist of strong, moisture-resistant, insulating material of low flammability.

E2.4

Any plastic material used in the detector shall meet the requirements of the test specified in E7.2.

E2.5

Any sealing compound used in a detector shall not fail to perform its intended function at any temperature less than 20°C above the detector's rated temperature.

E3 Mounting facilities

E3.1

Detectors shall be provided with a suitable means for their secure mounting. This mounting shall be designed so that it has sufficient strength to resist any distortion which may affect the operation of the detector where fixed to an uneven surface.

E3.2

The means of mounting detectors shall be such that they are supported independently of their connecting leads, and provision shall be made for accommodating this wiring by means of a mounting recess or connection box.

E4 Connecting facilities

E4.1

Terminals shall be so designed that the conductors connected to them are rigidly and effectively clamped between metal surfaces and that a connection shall not slacken or overheat under normal conditions of use. The metal clamping surfaces or screws that come into direct contact with conductors shall be made of non-ferrous materials.

E4.2

The terminals shall be capable of taking at least two conductors each of 1.5 mm^2 of cross-sectional area. Soldered joints shall be made without use of fluxes containing corrosive substances.

E4.3

Each terminal shall be marked, either by colouring, lettering, or otherwise as may be necessary, to indicate the correct manner of connecting it to the circuit conductors. The marking shall remain legible during the service life of the detector. No identification marking shall be placed on screws, washers, or other parts which may be removed when conductors are being connected.

E4.4

Where pillar-type terminals are used, the screw shall be of sufficient length to extend to the far side of the terminal hole and shall have a diameter approximately equal to that of the hole. The ends of the screws shall be rounded or chamfered to prevent damage of the conductors, and the side of the hole against which the screw bears shall be smooth and unbroken.

E4.5

Binding-screw type terminals shall be designed to retain the strands of the conductor, and if the connection is made under the head of a screw or bolt, a cup-shaped washer or equivalent device suitable for repeated use shall be provided.

E4.6

Screw threads shall comply with an appropriate specification. The terminal screws shall engage at least two full threads in metal and shall be capable of passing the torque test requirements given in AS/NZS 3100. During, and as a result of this test, the threads of the screwed component and its fixing shall not strip, insulating material shall not crack and there shall be no other failure that would render the screwed component non-reusable.

E4.7

Detectors intended for use in areas prone to higher corrosion than normal shall have their electrical connections encapsulated or otherwise protected to prevent the ingress of moisture.

E5 Internal conductors

All internal conductors of an electrical detector shall be provided with a minimum of 250 V grade insulation or equivalent insulating sleeving, apart from short lengths adequately and permanently spaced from non-current-carrying metal parts.

E6 Contacts

E6.1

Contacts shall have surfaces of suitable material such as silver or other metal or alloy of equivalent characteristics. For any application where hydrogen sulphide or other corrosive gas may be present, contacts shall be made of palladium or similar corrosion resistant metal.

E6.2

Electrical contacts and other moving parts of a detector shall be enclosed in a manner that shall afford protection against moisture, dust, insects, and other foreign matter which may adversely affect their normal operation.

E6.3

Any adjustment affecting the operation of the detector shall be a factory adjustment, and shall be effectively and permanently sealed to prevent tampering or movement under normal conditions of installation and use.

E7 Tests

E7.1 General

E7.1.1

Sufficient samples shall be supplied for appraisal testing to enable a minimum of five detectors to be subjected to each test.

E7.1.2

Unless otherwise stated, all tests shall be initiated and conducted with the test apparatus, sample detector, and air stream or test liquid stabilised at a temperature of 23 ± 2°C.

E7.1.3

Unless otherwise stated, all tests shall be initiated and conducted with the sample detector connected in the normal way to a compatible zone control unit (or equivalent), in normal operational orientation. The control and indicating equipment shall be reset as necessary after each detector operation.

E7.1.4

A suitable airflow oven for carrying out the tests of E7.5.1(c) and E7.5.2 shall satisfy the rate of rise of temperature requirements, and have a minimum air velocity of 0.15 m/s at the point where the test sample is situated.

E7.1.5

The actual (measured) fixed operating temperature of individual detectors may be used for performance testing instead of the rated temperature. In these cases, the detector's actual operating temperature shall be established as per E7.7.

E7.1.6

During the airflow oven tests of E7.5.1(c) and E7.5.2, the rear of the sample shall be covered or sealed to prevent any airflow through the sample that is not characteristic of a normal installation.

E7.2 Heat-resisting test

The enclosure, base and the insulating material between current-carrying and non-current-carrying parts shall be subjected to a ball pressure test by means of the apparatus shown in Figure E1. The surface of the part for test shall be placed in a horizontal position and a steel ball of 5 mm diameter shall be pressed against this surface with a force of 20 N. The test shall be made in a heating cabinet at the detector's rated temperature plus 20 ± 5°C. After 1 hour, the ball shall be removed and the diameter of the impression measured. This diameter shall not exceed 2 mm.

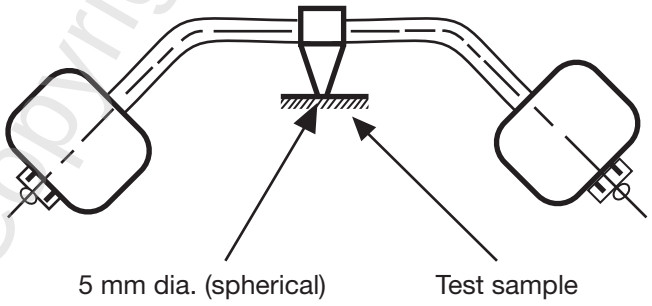


Figure E1 – Ball pressure apparatus

E7.3 Resistance to shock test

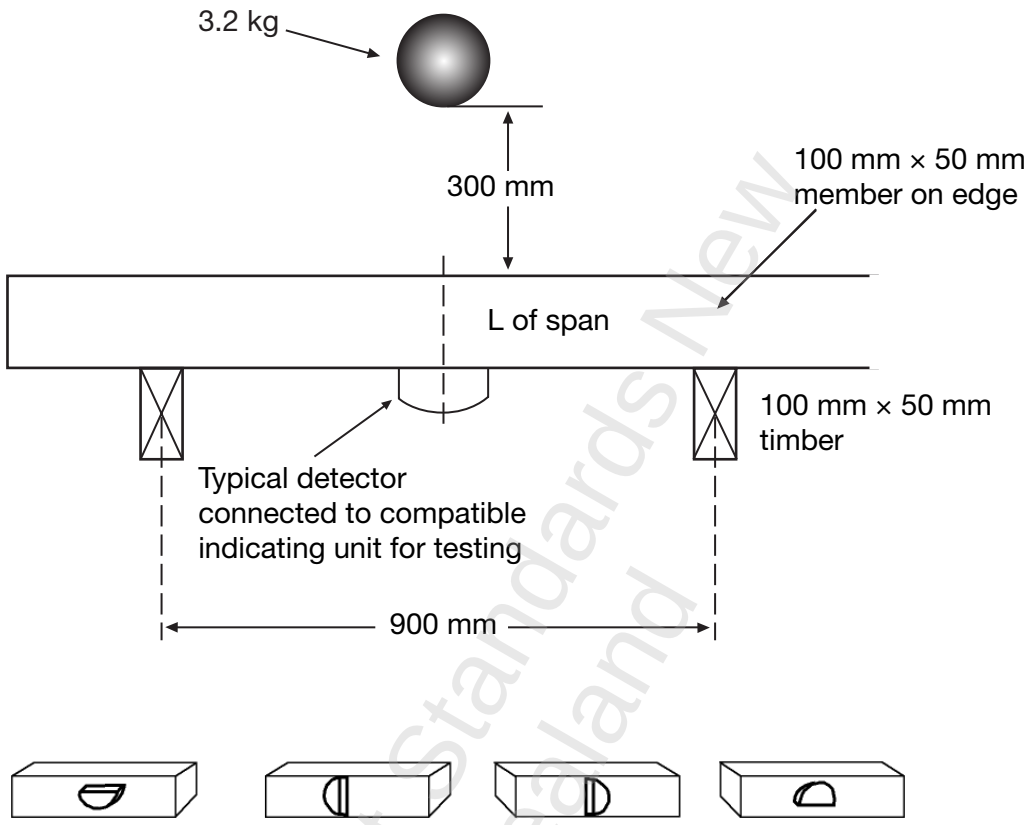
E7.3.1

A detector shall be capable of withstanding a test for resistance to shock by means of the test arrangement shown in Figure E2. The detector shall be mounted on a piece of 100 mm by 50 mm hardwood timber fixed on edge on supports of the same material spaced 900 mm apart (centre to centre). The test shall be made with the detector in the

following positions:

(a) At the midpoint on the horizontal underside; and

(b) At the midpoint on the vertical side (tested at the four different orientations shown).



Additional positions for testing detectors

Figure E2 – Resistance to shock test

E7.3.2

A metal sphere weighing 3.2 kg shall be dropped on to the midpoint of the timber from a height of 300 mm above the horizontal face of the timber.

E7.3.3

The detector shall be considered satisfactory if:

(a) No operation of the detector is indicated as a result of the shock;

(b) No failure of any component occurs during the test; and

(c) The response time of the detector lies within the limits specified in E7.5.1(c) or E7.5.2(d) (as applicable) after the shock test.

E7.4 Vibration test

E7.4.1

A detector shall be attached in its normal operating orientation to a vibrating table. It shall then be subjected to a vertical sinusoidal vibration of amplitude 0.127 mm peak to peak for a period of 5 min at each of the following frequencies: 10 Hz, 15 Hz, 20 Hz, 25 Hz, 30 Hz, 35 Hz, 40 Hz, 45 Hz, 50 Hz, 55 Hz, and 60 Hz.

E7.4.2

Operation of the detector or resonance of any component shall be noted. If resonance occurs the detector shall be vibrated at the resonant frequency for a period of 60 min. If no resonance occurs, the detector shall be vibrated at 50 Hz for 60 min.

E7.4.3

The detector shall be considered satisfactory if:

(a) No operation of the detector is indicated during vibration;

(b) No failure of any component occurs during the test; and

(c) The response time of the detector lies within the limits specified in E7.5.1(c) or E7.5.2(d) (as applicable) after vibration.

E7.5 Performance tests

E7.5.1

Fixed-temperature detectors shall sequentially pass all the following tests:

(a) The heat collector or sensing element of the detector shall be immersed in oil. The temperature of this liquid shall then be raised to 5.5 ± 1°C below the detector's rated temperature. This temperature shall be maintained for 24 h during which the detector shall not operate;

(b) The heat collector or sensing element of the detector shall be immersed in oil which has been preheated and maintained at 5.5 ± 1°C above the detector's rated temperature. The detector shall operate within 60 s of immersion; and

(c) The heat collector or sensing element of the detector shall be placed in a suitable heated airflow testing oven. When the air temperature is raised at a rate of 5.5°C per min the detector shall operate not later than 3 min after the air temperature reaches the detector's rated temperature.

E7.5.2

Rate-of-rise detectors shall pass all of the following tests:

(a) The heat collector or sensing element of the detector shall be placed in a suitable heated airflow testing oven. The temperature of the heated air shall be raised at several different rates of rise and as evenly as possible. During this test the detector shall operate within the minimum or maximum response curves shown on the graph in Figure E3;

(b) Rate-of-rise fire detectors shall include in their construction a limiting mechanism or fixed temperature detector. After the performance tests in heated air described in E7.5.2(a) above, the following additional tests shall be made to ensure the stability of the detector and the fixed temperature limit;

(c) The heat collector or sensing element of the detector shall be immersed in oil or other suitable liquid (or placed in a suitable heated airflow testing oven) and raised to a temperature of 5.5 ± 1°C below the detector's rated temperature. This temperature shall be maintained for 24 h during which the fixed temperature device shall not operate, nor shall the rate-of-rise response device operate once it has stabilised in the elevated temperature;

(d) The heat collector or sensing element of the detector shall be placed in a suitable heated airflow testing oven. When the air temperature is raised at a rate of 2°C per minute the fixed temperature device shall operate not later than 7.5 min after the air temperature reaches the detector's rated temperature, whether or not the rate-of-rise device has operated.

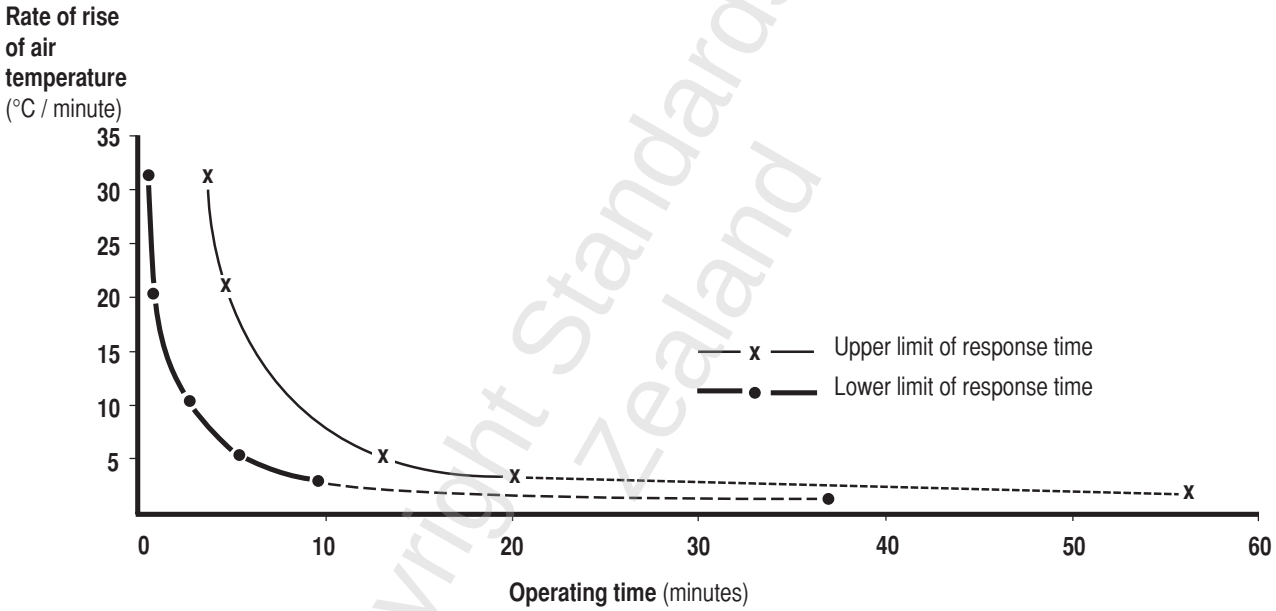


Figure E3 – Rate-of-rise heat-actuated fire detectors

E7.6 Corrosion test

E7.6.1

Upon satisfactory completion of the performance tests of E7.5.1(c) or E7.5.2(d) (as applicable), detectors shall be subjected to a 16-day exposure to an atmosphere of neutral salt spray (fog).

E7.6.2

The procedure and equipment used for salt spray shall follow those described in ASTM B117.

E7.6.3

A detector shall be considered satisfactory if:

(a) Normal use of the detector is possible after salt spray exposure;

(b) No significant structural failure of any component occurs during the salt spray exposure; and

(c) On subsequent retest to E7.5.1(c) or E7.5.2(d) (as applicable), the detector's response time is no greater than 1.25 times the applicable limit.

E7.7 Determination of fixed operating temperature (option with requirements)

E7.7.1

As permitted in E7.1.5, the actual (measured) fixed operating temperature of individual detectors may optionally be used in performance testing instead of the rated temperature.

E7.7.2

The heat collector or sensing element of the detector shall be immersed in oil or other suitable liquid. The temperature of this liquid shall then be raised at a rate less than 0.5°C per minute until the fixed temperature element of the detector operates. This temperature shall be recorded as the (measured) fixed operating temperature of the detector.

E7.7.3

The (measured) fixed operating temperature of the detector shall be within ± 3°C of the detector's rated temperature.

E8 Temperature classification

E8.1

All detectors shall be classified according to their rated temperature (at which the fixed temperature element is set).

E8.2

The colour code for each temperature classification shall be as follows:

Range within:	
54°C – 70°C	Blue
71°C – 80°C	Yellow
81°C – 105°C	Green
106°C – 121°C	White
> 121°C	Black

E9 Marking

E9.1

The following information shall be clearly and permanently marked on all detectors:

(a) The manufacturer's name or registered trade mark;

(b) Colour code to indicate the fixed element temperature classification. This shall be visible when the detector is fixed in place;

(c) The detector's rated temperature (see 1.4); and

(d) Identification of detectors for use in corrosive atmospheres.

NOTE – The information in E9.1(a), (c), and (d) is not required to be visible when the detector is fixed in place.

E9.2

Where a detector's rated temperature is determined remotely (for example, an analogue addressable device), the colour code and rated temperature markings of E9.1(b) and (c) may be replaced by a type or model identification, provided the actual rated temperature selected is readily verifiable by other means.

E10 Electromagnetic interference and compatibility

Detectors shall comply with all applicable requirements of 2.24 for both radiated emissions and immunity.

APPENDIX F – SPECIFICATION FOR MANUAL CALL POINTS

(Normative)

F1

Manual call points shall be of a strong, rigid construction. The method of operation shall be two-stage, either:

(a) The breaking or displacing of a frangible or resettable element followed by the manual operation of a switch; or

(b) The opening of a transparent cover or flap followed by the breaking or displacing of a frangible or resettable element.

The operational element(s) shall contrast visually to their background.

F2

The method of operation shall be clearly indicated by a concise inscription similar to that shown in Figure F1 This notice shall be displayed on or adjacent to each manual call point. The minimum dimensions of this notice and of the manual call point shall be 85 mm by 85 mm, and the colour of the shaded area shall be safety red (see 1.4).

Figure F1 – Typical notice to be displayed on, or adjacent to, each manual call point

NOTE – Insert the method of operation, telephone number of fire brigade or other site emergency number, in the spaces provided.

F3

The construction shall provide safeguards against accidental operation.

F4

All manual call points shall provide a visual indication of operation. This indication shall latch in the alarm condition until manually reset from the control unit. Only one such manual call point (or detector) indication is required to illuminate at a time per zone.

F5

Connection arrangements shall be such that it is not possible to remove a manual call point from the circuit without initiating a defect warning.

F6

The frangible material or resettable element shall comply with the test requirements of BS EN 54-11 or ISO 7240-11.

F7

Manual call points exposed to the weather or other damp locations (such as wash down areas or manufacturing processes) shall have a degree of protection to at least IP54 of AS 60529. This may be achieved by means of the cover of F1(b), or by an additional cover labelled 'COVER ONLY'.

F8

In situations where the frangible element presents a health hazard (such as food preparation areas) and an additional cover labelled 'COVER ONLY' is provided, the frangible element of F1(a) may be omitted.

F9

The colour finish of the outside shall be safety red (see 1.4) on at least 50% of the exposed surface.

F10

Where a manual call point uses a mechanical contact to initiate a fire alarm, that contact shall be closed in its normal condition, opening to initiate the fire alarm except where a manual call point uses wireless technology for its signal transmission.

F11

Where the occupancy of the premises can result in repetitive malicious fire alarms, the cover of F1(b), or an additional cover labelled 'COVER ONLY', may incorporate a non-latching audible device to identify that the cover has been opened.

F12

Any cover or flap shall not impede the easy activation of the manual call point.

F13

Manual call points shall comply with all applicable requirements of 2.24 for both radiated electromagnetic emissions and electromagnetic immunity.

F14

A red single-action (type A) manual call point complying with BS EN 54-11 or ISO 7240-11 and fitted with a transparent cover or flap is deemed to comply with F1(b), F3, F6, F9, and the dimensional requirements of F2.

APPENDIX G – AUDIBLE ALERTING SIGNALS

(Normative)

G1 General

Unless otherwise specified in this standard, audible alerting signals shall comply with the following requirements, as applicable.

G2 Evacuation signal

G2.1

The evacuation signal shall be emitted in cycles of 24 s nominal duration. Each cycle shall consist of four identical bursts of a frequency-modulated square wave tone uniformly (by period or frequency) increasing from 500 Hz to 1200 Hz, followed by one or two identical verbal messages, in accordance with Figure G1.

G2.2

Where required by the particular application, the total length of the verbal evacuation message may be extended to a maximum of 20 s per cycle, and the message repetition may be omitted, however the four tone bursts per cycle shall remain.

G3 Alert signal

G3.1

The alert signal shall be a repetitive interrupted square wave tone of 420 Hz having equal on-off duration of 0.625 s each.

G3.2

Upon assignment of an alert signal to an evacuation zone, the first tone burst may be 50 dB below the maximum output, in which case each successive tone burst shall have an amplitude of 10 dB above that of the previous one until the maximum is reached at the sixth tone burst. All subsequent tone bursts after the sixth shall have the maximum output.

G3.3

A graphical representation of the initial character of the alert signal (with the optional amplitude escalation) is given in Figure G2.

G3.4

A verbal message shall be interspersed with the alert signal, provided that between 15 s and 24 s of alert tone cadence is produced between messages. The verbal alert message should have a maximum total length of 20 s.

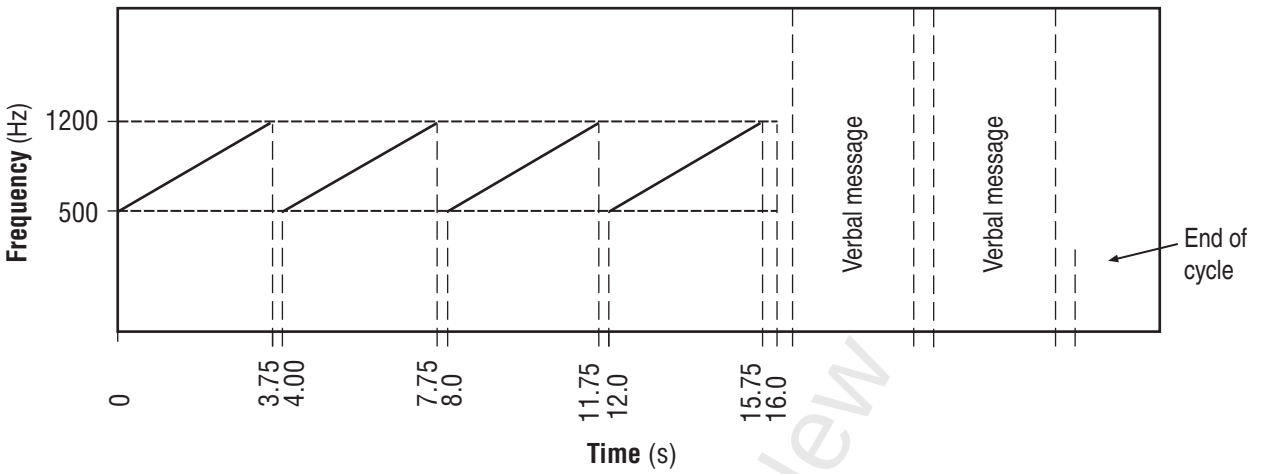


Figure G1 – Typical evacuation signal

G4 Verbal messages

G4.1

Verbal messages shall be either digitally stored or use voice-synthesised techniques. All messages shall be clear and intelligible, without heavy accent. The signal shall have a minimum operational bandwidth of 300 Hz to 4 kHz.

G4.2

Each verbal message shall be in a form consistent with the particular building's evacuation scheme, and shall provide clear and readily understandable instructions.

G4.3

The verbal evacuation message should include the word 'evacuate' as well as the word 'fire' and/or 'emergency'.

NOTE – In addition to English, messages may be repeated in other languages (for example, te reo Māori), as appropriate.

G5 Tolerances

The frequencies and durations for audible signals specified may vary within ± 5%, over the full operating temperature range, including anticipated long-term ageing effects. Amplitudes specified in G3 may vary within ± 5 dB. Digitally generated, frequency-stepped increments shall not exceed 4%.

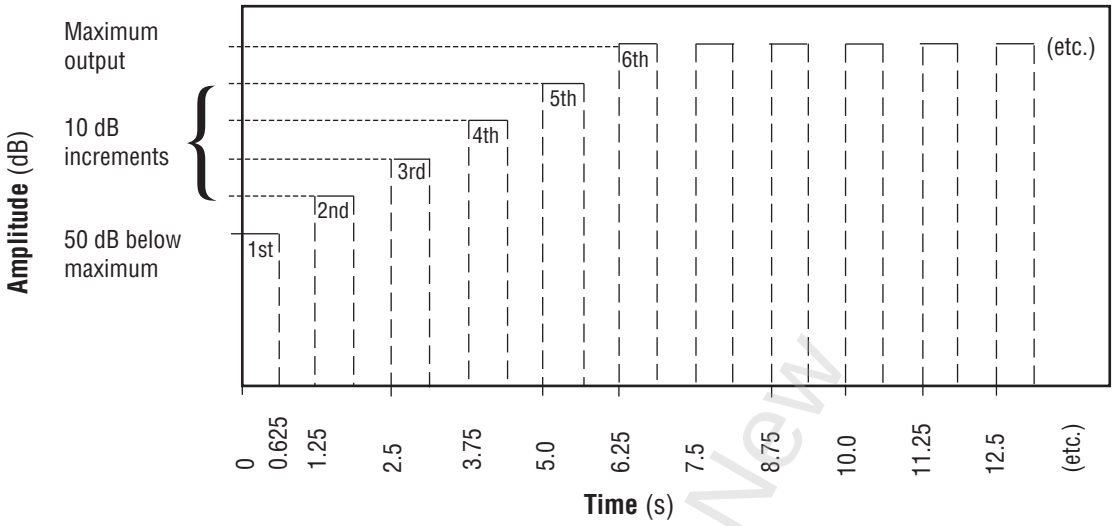


Figure G2 – Alert signal

APPENDIX H – STANDARD ZONE INDEX SYMBOLS

(Normative)

Table H1 – Symbols

Symbol	Usage	Colour
	Building outline (bold)	Black
	Internal walls with no through access. May also be zone demarcation	Black
	Zone demarcation with access available between zones	Black
	Projection line to a plan view of a hidden area eg mezzanine, basement	Black
	Area of special fire protection or ancillary system coverage	Black
	Accessway between levels – stairs, escalators, travelators, ramps	Black
	Lift	Black
'YOU ARE HERE'	Reader orientation title (upper case)	Black
	Directional arrow indicating a location	Black
	Building access point Placed outside building outline and oriented appropriately	Black
	Main indicating unit (fire alarm panel)	Black
	Sector indicating unit	Black
	Repeater zone index (mimic panel)	Black
	Special connected system control panel. n = Zone number	Black
	Main electrical switchboard	Black
H	Fire hydrant inlet	Red
	Fire hydrant outlet	Red
FSI	Fire sprinkler inlet	Red
CV	Sprinkler control valves (if not co-located with FSI) (CV location can also be written adjacent to 'sprinkler operated' light-emitting diode (LED))	Red

The font shall be upper case Arial, and a minimum size of 4.0 mm.
The zone index background colour shall be white.
All lettering shall be positioned to read horizontally. Vertical alignment is not permitted.
Use of a legend is only required when additional non-standard symbols are required and their meaning is not clearly discernible.

APPENDIX J – SELECTION AND LOCATION OF FIRE DETECTORS

(Informative)

J1 General

J1.1

Fire detectors are designed to respond at an early stage to one or more of the four major characteristics of combustion, that is, heat, smoke, flame, or gas.

J1.2

No single type of fire detector is suitable for all types of premises, situations, or types of fires, but some detector types are better suited to detect certain types of fire than others, and each detector type is prone to different sources of spurious activation. See Table J1 for general recommendations of suitable and unsuitable fire detectors for various applications.

J1.3

Detectors should be chosen for the best response to the effects of fire without spurious activation caused by ambient conditions. The best results might be obtained by installing a mixture of detector types.

J1.4

Detectors should be located where detection is most likely in the early stages of a fire. The smoke produced by a smouldering fire is likely to be moved about in a room by the general air movement. As soon as flaming combustion starts, convection will lift the smoke and heat to the ceiling and spread it horizontally. Therefore, standard practice is to locate detectors at regular intervals on the ceiling.

J1.5

Heating, ventilation, and air conditioning systems (HVAC), high or glass roof ceilings, or other building characteristics can significantly impair the effectiveness of detectors, as the smoke or heat might fail to reach the detector. In such cases, alternative locations and/or additional detectors might be necessary.

J1.6

There is no substitute for good engineering practice, and the selection of the detector most suitable for the environment and for the characteristics of the fires that might occur.

NOTE – The Acceptable Solutions and Verification Methods for NZBC Fire Safety Clauses specify types of fire safety systems, similar to those of Appendix B, incorporating manual call points, heat and smoke detectors, and sprinklers. The use of any other detector type for basic coverage is an Alternative Solution and will need to be supported by specific fire engineering design.

J2 Heat detectors

J2.1

Heat detectors respond to the temperature rise associated with a fire.

J2.2

A fixed temperature heat detector is designed to operate when the temperature at the detector exceeds a predetermined value. A rate-of-rise heat detector is designed to operate when the rate of temperature rise at the detector exceeds a predetermined value.

J2.3

Smoke detectors should be preferred to heat detectors where detection of visible smoke or smouldering fires is required. Rate-of-rise heat detectors should be avoided where rapid temperature fluctuations are expected.

J2.4

Line-type heat detectors are a useful alternative to point-type heat detectors, particularly where access for test and maintenance is difficult (for example, high ceilings and confined spaces). They are also useful for detection in long thin risks (for example, cable trays, tunnels, and conveyor belts). Several technologies are available, which should be matched to each application.

J3 Ionisation smoke detectors

J3.1

Ionisation smoke detectors respond to very small smoke particles.

J3.2

Ionisation smoke detectors have a wide range of response. They are most sensitive to fire situations where flaming has occurred and are less sensitive to slow smouldering fire situations where flaming has not yet occurred. They contain a small amount of radioactive material that could in future present disposal problems.

J3.3

Ionisation smoke detectors should be avoided in cooking areas, in areas subject to high air velocity or wind gusts, near sources of steam, or anywhere combustion exhaust might be present.

J4 Photoelectric smoke detectors

J4.1

Photoelectric smoke detectors measure the scattered light from smoke particles. They are most sensitive to larger, cooler, smoke particles typical of smouldering fires and fires involving overheated electrical cabling. They are sometimes called ‘optical’ or ‘photo-optical’ detectors.

J4.2

Photoelectric smoke detectors should be avoided where steam or dust might occur. They can be used in locations where motor vehicles operate.

J4.3

As the combustion products from alcohol and some chemical fires are generally invisible, they might not be detected by this type of detector.

J5 Linear beam smoke detectors

J5.1

Linear beam smoke detectors measure the reduction of intensity of a beam of light due to the presence of smoke particles. They have a broad response to a wide range of smoke types and are particularly useful for smoke detection in large spaces.

J5.2

They are potentially sensitive to misalignment of, or interference with, the light beam, and therefore require careful installation. Specific adverse influences include building occupant activity, thermal expansion, wind and seismic deformation, and strong light sources.

J5.3

Specific fire engineering is strongly recommended for glazed, sloping or high ceiling applications to ensure correct placement and orientation.

J6 Aspirating smoke detectors

J6.1

Aspirating smoke detectors use high sensitivity detection elements connected via an aspirating system (suction fan) to a pipe network, with air sampling points located similarly to point style smoke detectors.

J6.2

Careful engineering design of the aspirating pipe network is necessary to ensure their effective use.

J6.3

The aggregation of simultaneous smoke entry through multiple sampling points is particularly helpful to combat dilution effects in large spaces.

J7 Flame detectors

J7.1

Flame detectors respond to the radiation emitted by a fire. They operate by line of sight so need to be aimed at the fire, so it is normally necessary to use several detectors to cover one area. Careful engineering design is needed to ensure their effective use.

J7.2

Flame detectors are most suitable for detecting very fast-growing fires such as flammable liquid fires, and are also useful for detecting flaming fires in large open spaces.

J8 Carbon monoxide (CO) fire detectors

J8.1

CO fire detectors respond to the presence of carbon monoxide (CO) gas which is characteristic of fires involving carbon-based materials and is particularly toxic to humans.

J8.2

Carbon monoxide is produced when incomplete combustion occurs during slow or smouldering fires. CO is generally present in indoor fires where mixed materials burn.

J8.3

CO detectors are unsuitable for detecting clean burning fires where complete combustion is accomplished, CO detectors should also be avoided anywhere combustion exhaust gases might be present. Due to CO fire detectors being a relatively recent technology, they are currently recommended only for supplementary use as part of a specific fire engineering design.

J9 Combination detectors

J9.1

Combination (sometimes known as 'multiple criteria' or 'multi-sensor') detectors combine two or more of the above detection techniques in a single device.

J9.2

The most common combination detectors are photoelectric smoke and heat devices. Combining a heat sensor and a photoelectric smoke detector increases the device's response to faster flaming fires that produce less visible smoke. Such detectors can achieve a similar response to ionisation detectors across a broader range of fires but without the same spurious activation characteristics.

J9.3

Manufacturers have also introduced other combinations of sensors in their detectors with the objective of achieving a broader response to genuine fires and increased immunity to unwanted alarms.

J10 Cleaning of smoke detectors

Smoke detectors should be cleaned only in accordance with the detector manufacturer's instructions. Careful checking should always be carried out during site inspections or surveys to ensure that no smoke detector grilles are clogged with dust, cobwebs, or dead insects.

Table J1 – Recommended fire detectors for different applications

Location	Ionisation smoke	Photoelectric smoke	Linear beam smoke	Aspirating smoke	Carbon monoxide (CO)	Fixed temperature Thermal	Rate of rise thermal	Flame	Specific fire engineering
Bedrooms/sleeping areas	✓	✓	OK	OK	✓	OK	OK	OK	OK
Offices, shops	✓	✓	OK	OK	✓	✓	OK	OK	OK
Auditoriums/clubs (theatrical smoke)	x	x	x	x	✓	✓	OK	OK	✓
Autoclave/sterilizer areas	x	x	x	x	✓	✓	x	OK	OK
Bathrooms/laundries	x	x	x	x	OK	✓	x	OK	OK
Boiler/furnace rooms	x	x	x	x	x	✓	x	x	OK
Car parking [1]	x	x	OK	x	xx	✓	✓	OK	OK
Ceiling or roof voids with access	OK	OK	OK	OK	OK	✓	OK	OK	OK
Ceiling or roof voids difficult access	x	x	OK	OK	x	✓	OK	OK	✓
Cleaners'/understair cupboards	x	x	x	x	x	✓	✓	OK	OK
Cool rooms/freezers [2]	x	x	x	OK	x	OK	✓	OK	✓
Electrical risers	✓	✓✓	x	OK	x	✓	OK	OK	OK
Electrical switchrooms/cupboards	✓	✓✓	OK	✓	x	✓	OK	OK	OK
Flammable liquid hazard areas [3]	✓✓	✓	OK	OK	x	✓	OK	✓	OK
Forced air flow/draughts	x	✓	OK	OK	OK	✓	OK	OK	✓
Fume cupboards [3]	x	x	x	x	x	✓	✓	OK	✓
High/difficult access ceilings	OK	OK	✓✓	✓	✓	OK	OK	OK	✓
HVAC duct sampling	OK	✓	OK	OK	x	x	x	x	✓
Ice rinks [1]	OK	x	OK	OK	OK	✓	✓	OK	OK
Kitchens	x	x	x	x	OK	✓	x	x	OK
Kitchen extract ducts [1]	xx	xx	xx	xx	x	✓	x	x	OK
Paint spray booth(s) [3]	x	x	x	x	x	✓	OK	OK	OK
Service shafts	✓	✓	x	OK	✓	OK	OK	OK	OK
Stables [1]	x	x	OK	x	✓	✓	OK	OK	OK
Warehouse with vehicles and/or non-electric forklift	xx	✓	OK	OK	xx	✓	OK	OK	OK
<1.8 m from rooms containing bath, shower, or steam source	x	x	x	OK	✓	✓	x	OK	✓

KEY – ✓✓ strongly recommended ✓ recommended OK may be used
x not advised xx do not use

NOTE –

(1) Environmental protection might also be required.

(2) Cold rooms and freezers can be difficult to reliably protect and will usually need special engineering including heaters to prevent ice build-up on detectors, manual call points, and alerting devices.

(3) Hazardous area.

APPENDIX K – APPLICABILITY OF 4.5.2, 4.5.3, AND 4.5.4 TO LINE-TYPE HEAT DETECTORS AND BEAM-TYPE SMOKE DETECTORS

(Normative)

NOTE – This appendix is referenced in 4.5.5.2(a) and 4.5.5.4(b)

Is clause applicable and appropriate?				
Clause	**Line-type Heat**	**Notes**	**Beam-type smoke**	**Notes**
4.5.2				
(a) - (c)	Yes		Yes	
(d)	Yes		NS	
(e) - (h)	Yes		Yes	
(i) - (o)	NS		NS	
4.5.3				
(a) - (b)	Yes		Yes	
(c)	See Note	Applicable for detection purposes. Cable may run to a wall-mounted end of line device, or via a wall in transition to another area.	See Note	Manufacturers' installation instructions might require greater clearance than 200 mm
(d) (i)	Yes		Yes	
(d) (ii)	Yes		NA	
(d) (iii)	Yes		Yes	
(d) (iv)	Yes		See Note	Limitations on maximum distance from ceiling and manufacturer's clearance requirements may make beam smoke detector unsuitable
(d) (v)	Yes		Yes	
(d)(vi)	Yes		Yes	
(d) (vii)	Yes		Yes	
(d) (vii)	Yes		Yes	
(d) (ix)	Yes		Yes	
(d) (x)	Yes		NA	
(e) (i) (A)	Yes	Exceeding limits for short distances to clear protrusions is acceptable	NA	
(e) (i) (B)	NA		NA	
(e) (i) (C)	NA		Yes	
(e) (i) (D)	NA		NA	
(e) (ii)	Yes		Yes	
(e) (iii)	Yes		Yes	
(f)	Yes		See Note	Noting minimum distance from ceiling
(g)	Yes		Yes	
4.5.4.1				
(a) - (h)	Yes		Yes	

Is clause applicable and appropriate?				
Clause	**Line-type Heat**	**Notes**	**Beam-type smoke**	**Notes**
4.5.4.2	Yes		See Note	Noting that beam-type smoke detection might be unsuitable depending on the area and environment.

Key	
Yes	clause is appropriate and applicable
NS	detection type unsuitable for this scenario
NA	not applicable to this detector type
See Note	applicable with note

APPENDIX L – GUIDELINES FOR THE INSTALLATION OF VISUAL ALERTING DEVICES

(Informative)

L1 General

This appendix provides guidance to aid the designer and installer in the selection and placement of visual alerting devices (VADs). It should be read in conjunction with the product manufacturer's datasheets and installation documentation.

Visual alerting devices are required (see 4.6.4.2) to be installed in such a manner so as to ensure perception by the building occupants and to meet a minimum illumination of 0.4 lux in all areas of coverage.

The best way to achieve perception under the broadest ambient lighting conditions is to design the system so that occupants can see the visual alerting devices while undertaking their normal activities within a space. This is referred to as direct viewing.

When light levels are low and surface finishes reflect light, rather than absorb it, indirect viewing, which relies on seeing the VAD flash via reflected light, can also be effective in some situations and can help in rooms with visual obstacles or unusual geometry. However, extreme care should be taken, and the long-term reflectivity of surface finishes should be considered (dark surfaces will reflect very little or possibly no light). It is strongly recommended to design for direct viewing.

In general, wall-mounted VADs are the preferred choice for general applications and higher ambient light levels. Ceiling-mounted VADs are more practical for large open spaces. A combination of both types might be necessary to achieve the best results.

L2 Standards and ratings

Visual alerting devices are required by 2.18.5(a) to comply with UL 1971, BS EN 54-23, ISO 7240-23, or AS ISO 7240.23.

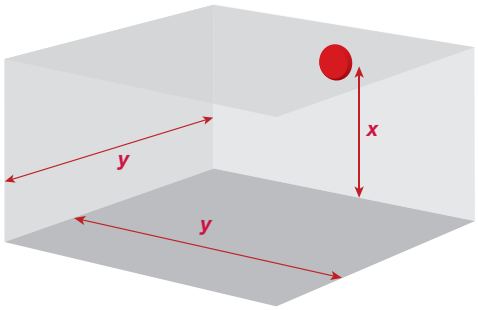
UL 1971 is a North American standard. At the time of publication of this standard the majority of UL 1971-compliant devices are xenon based and rated in candela (effective). Tables L1, L2, and L3 show the minimum recommended candela rating of the VAD (which for some devices is user-selectable via links or switches) and the required quantity of VADs for a given room size.

(BS) EN 54-23 is a European standard, ISO 7240-23 is an international standard, and AS ISO 7240.23 is an amended version of ISO 7240-23 for Australia. These three standards have similar technical requirements and rely on a parameter value specified by the VAD manufacturer to specify the mounting location (wall, ceiling, or 'open') and area coverage to provide a minimum illumination of 0.4 lux. Devices are given a maximum installation height (x) and cuboid/cylinder dimension (y) as follows:

(a) Category '***W-x-y***' for wall-mounted VADs (see Figure L1) is where:

  (i) ***x*** is the maximum mounting height of the device on the wall in metres, and

  (ii) ***y*** is the length and width in metres of the cuboid volume covered to give a minimum level of 0.4 lux when the device is mounted at a height of x;



(Courtesy of Eaton)

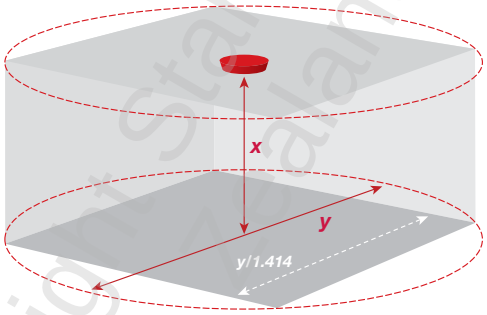
Figure L1 – Wall-mounted VAD coverage

Example: W-2.4-7.5 corresponds to a wall-mounted device giving a coverage cuboid volume of 2.4 m(h) × 7.5 m(w) × 7.5 m(d) when wall-mounted at a height of 2.4 m.

(b) Category '***C-x-y***' for ceiling-mounted VADs (see Figure L2) where:

(i) ***x*** is the maximum height in metres at which the VAD may be mounted on a ceiling, and

(ii) ***y*** is the diameter in metres of the cylindrical volume covered to a minimum level of 0.4 lux; or

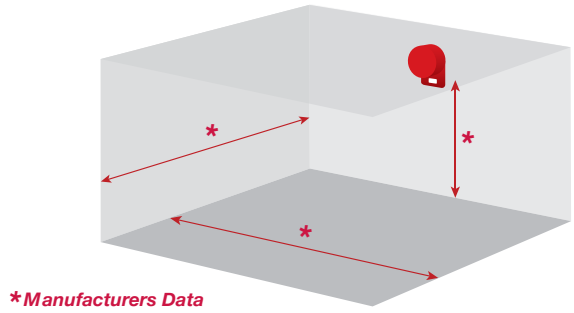


(Courtesy of Eaton)

Figure L2 – Ceiling-mounted VAD coverage

Example: C-3-15 corresponds to a ceiling-mounted device giving a coverage cylindrical volume of 15 m diameter at a height of 3 m. The room is required to sit inside this circle, thus dividing ***y*** by the square root of 2 (1.414) gives a maximum room size of 10.6 m × 10.6 m.

(c) Category '***O x-y***' devices will have the coverage area, recommended mounting position, and any other requirements or restrictions specified by the VAD manufacturer (see Figure L3).



(Courtesy of Eaton)

Figure L3 – Other type VAD coverage

L3 Typical VAD locations and spacing

The design methodology for an installation of visual alerting devices, irrespective of the standard with which the devices comply, is essentially the same – divide the individual spaces into virtual squares based on the rating or candela output of the VADs being used.

To obtain equivalence between UL 1971 and BS EN 54-23, ISO 7240-23, or AS ISO 7240.23 devices, Table L1 can be used to convert candela values to area coverage values (rating) to simplify designs for areas with non-square dimensions.

Table L1 – Conversion of UL 1971 candela (effective) values to EN 54-23 area coverage values

Wall-mounted devices		Ceiling-mounted devices			
cd (effective)	BS EN 54-23 rating	cd (effective)	BS EN 54-23 rating		
15	W-2.4-6.1	15	C-3-8.6		
30	W-2.4-8.5	30	C-3-12.8	C-6.1-8.6	
75	W-2.4-13.5	75	C-3-18.9	C-6.1-18.9	C-9.1-12.8
95	W-2.4-15.2	95		C-6.1-23	C-9.1-21.5
110	W-2.4-16.5	115			C-9.1-22.8
135	W-2.4-18.3	150			C-9.1-27.1
185	W-2.4-21.3	177			C-9.1-29.2

If not using conversion Table L1, then Tables L2 and L3 should be used to determine the locations and quantities of wall-mounted or ceiling-mounted VADs complying with UL 1971. It is sometimes necessary to use a combination of wall-mounted and ceiling-mounted VADs. Large or non-square spaces should be subdivided into multiple squares for determining VAD locations and intensity settings.

Table L2 – Spacing for wall-mounted visual alerting devices complying with UL 1971

Maximum room size (m)	Minimum required light output (cd effective)	
	One light per room (centred along one wall)	Four lights per room (one light per wall – off-centre)
6.1 × 6.1	15	Not allowed
8.5 × 8.5	30	Not allowed
9.1 × 9.1	34	Not allowed
12.2 × 12.2	60	15
15.2 × 15.2	94	30
16.5 × 16.5	110	30
18.3 × 18.3	135	30
19.2 × 19.2	150	37
20.7 × 20.7	177	43
21.3 × 21.3	184	60
24.4 × 24.4	240	60
27.4 × 27.4	304	95
30.5 × 30.5	375	95
33.5 × 33.5	455	135
36.6 × 36.6	540	135
39.6 × 39.6	635	185

Table L3 – Spacing for ceiling-mounted visual alerting device complying with UL 1971 and centred in room

Maximum room size (m)	Maximum lens height (m)	Minimum required light output (cd effective) for one light
6.1 × 6.1	3.0	15
9.1 × 9.1	3.0	30
12.2 × 12.2	3.0	60
13.4 × 13.4	3.0	75
6.1 × 6.1	6.1	30
9.1 × 9.1	6.1	45
13.4 × 13.4	6.1	75
14.0 × 14.0	6.1	80
6.1 × 6.1	9.1	55
9.1 × 9.1	9.1	75
15.2 × 15.2	9.1	95
16.2 × 16.2	9.1	110
16.8 × 16.8	9.1	115
18.0 × 18.0	9.1	135
19.2 × 19.2	9.1	150
20.7 × 20.7	9.1	177
21.3 × 21.3	9.1	185

NOTE –

(1) Data in Tables L2 and L3 reproduced and extracted with permission of NFPA from NFPA 72®, National Fire Alarm and Signaling Code®, 2019 edition. Copyright© 2019, National Fire Protection Association. For a full copy of NFPA 72®, please go to www.nfpa.org.

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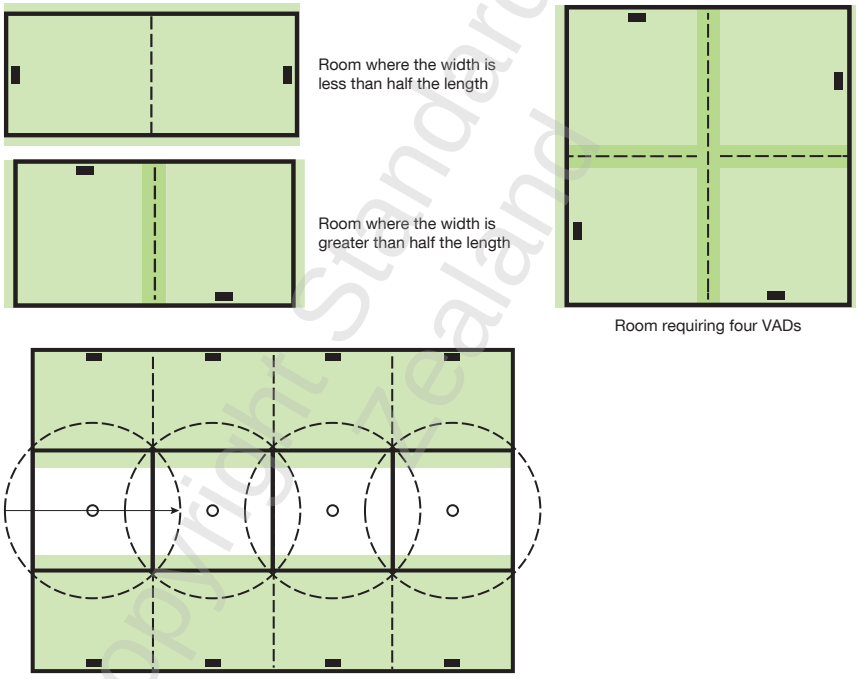
When using one wall-mounted VAD in a square or nearly square room the VAD should be located halfway along the longest wall, provided this location is also best suited for direct viewing.

In larger rooms that require more than one VAD, the room should be divided into squares for wall-mounted VADs and squares within circles for ceiling-mounted VADs as shown in the examples of Figure L4. If there are two wall-mounted VADs, these should be mounted on opposite walls. If there are four wall-mounted VADs, these should be mounted on each wall, located a quarter distance along each wall.



(Courtesy of Eaton)

Figure L4 – VAD location examples

L4 Adjustments for ambient light levels

Parameter values (ratings) can be adjusted based on direct or indirect viewing and ambient light levels. If the ambient light levels are unknown, then Table L4 can be used as an indicative guide to likely values for a range of common situations. In general, most normally occupied areas where some form of task is performed are likely to be in the range of 300 – 500 lux.

Natural light can significantly increase daytime ambient light levels, so the location of windows (particularly north facing) and skylights should also be considered when estimating possible maximum lux levels.

Where ambient light levels fall outside the 300 – 500 lux that Tables L1, L2, and L3 and the specified ratings assume, then Table 1 provides a multiplication factor that can be applied to increase or decrease the spacing of VADs to compensate for differing ambient light level. Such multiplication factors should be used only after careful consideration of the actual application, the likely ambient light levels based on the building's lighting design, and any need to rely on indirect viewing (which requires the VADs to either be brighter or more closely spaced).

Table L4 – Recommended and typical ambient light levels for common situations (from AS/NZS 1680.1)

Recommended maintained light level (lux)	**Typically expected light level** (lux)	**Characteristics/representative area/ activity**
80	100 – 300	Intermittent use. Toilets, changing/locker rooms, corridors and stairs, large item storage
160	200 – 400	Continuously occupied areas where tasks do not require great perception. Waiting rooms, lunchrooms, plant rooms, loading bays, large item fabrication
240	240 – 500	Moderately easy visual tasks. Filing/storage areas, general food preparation
320	320 – 500	Moderately difficult visual tasks. School classrooms, general office areas, packing and despatch, reading, writing
400	400 – 500	Moderately difficult visual tasks. Reception areas, libraries, medium item assembly work/inspection
600	600 – 800	Difficult visual tasks with small detail. Showrooms, small retail outlets, fine machine work, most inspection tasks
800	800 – 1000	Difficult visual tasks with very small detail. Supermarkets, large format retail (homewares, DIY), professional laboratories, fine inspection
1200	1200 – 5000	Extremely difficult visual tasks with extremely small detail. Jewellery and watchmaking, hand tailoring, very fine inspection and testing

L5 Synchronisation

Synchronisation of VADs in areas where more than one VAD can be seen at a time (either directly or indirectly) is necessary to prevent the possibility of triggering photosensitive epilepsy in some occupants.

The manufacturer's installation instructions for the devices being used should describe the correct method to enable synchronisation for those devices. Typical methods used are the installation of synchronisation modules, interlinking wires between VADs, or by the design of the device (such as utilising precision timing circuitry). Synchronisation might not be possible between devices from different manufacturers.

L6 Design documentation

To aid the accredited inspection body in certifying the system installation (see 5.5), design drawings should show the following:

(a) Room dimensions (or a scale);

(b) The location of each VAD;

(c) The intensity setting for UL 1971 devices or the coverage volume code for BS EN 54-23, ISO 7240-23, or AS ISO 7240.23 devices; and

(d) The expected maximum average ambient light level for the area.

If the expected ambient light levels are unknown, a value of 300 – 500 lux should be assumed for design purposes unless there is reason to choose another value.

APPENDIX M – INSTALLER'S DECLARATION OF COMPLETION FOR FIRE ALARM SYSTEM

(Normative)

Declaration of Completion **Number:** ..... **Dated:** .....

This declaration is to be completed and signed by the Installer.

This document should not be relied on by a BCA or TA as the sole evidence of compliance of the fire alarm system.

Designer/Installer details:

Company name(s) .....

Contact details of Installer (address, phone, email) .....

Name of designer .....

Qualifications of designer .....

Site details:

Building .....

Address .....

Legal description .....

Name of owner .....

Contact details of owner (address, phone, email) .....

Building consent details Number: ..... Date: .....

Fire Report details:

Issued by .....

Ref/version .....

Issue date .....

Fire Specification details:

Ref/version .....

Issued by .....

Issue date .....

System details:

System description/type .....

Number of zones .....

Control unit location .....

Declared functional requirements (circle): **a** **b** **c** **d** **e** **f** **g** **h**

Additional details:

.....

Control unit manufacturer .....

Equipment manufacturer(s) .....

Equipment listing numbers .....

Details of remote connection .....

Details of ancillary services .....

This declaration covers the following aspects of the fire alarm system installation:

Exclusions / exceptions:

Supporting documents and records provided: (tick to confirm)

Design and commissioning documentation	☐
Battery load and amp calculations	☐
Approved index plan	☐
Commissioning records	☐

Access details for all listed documents and records:

Installer's Declaration of Completion	
I hereby declare that the works described above have been designed, installed, and commissioned in accordance with NZS 4512:2021, and the cited building consent for the project, and that all supporting documents and records are provided or referenced, and on that basis the system is ready to be inspected and certified by an independent accredited inspection body.	
Date of completion	
Name of installer's representative	
Capacity of installer's representative	
Signed on behalf of installer	

APPENDIX N – CERTIFICATE OF COMPLIANCE FOR FIRE ALARM SYSTEM

(Normative)

Certificate of Compliance **Number:** ..... **Dated:** .....

Site details:

Building .....

Address .....

Legal description .....

Occupancy .....

Name of owner .....

Contact details of owner (address, phone, email) .....

Building consent details Number: ..... Date: .....

Fire Report details: *(see note 2)*

Issued by .....

Ref/version .....

Issue date .....

Fire Specification details: *(see note 2)*

Ref/version .....

Issued by .....

Issue date .....

Installer details:

Name of installer .....

Contact details of Installer (address, phone, email) .....

Date of completion ..... Declaration Number: .....

Access details for all listed documents and records:

This certificate encompasses the following areas of the building (select all that apply)**:**

Complete building (tick)	
The following areas as noted in the fire report (describe)	
Control unit replacement (tick)	

Notes

Accredited inspection body		
I hereby certify that the system, described in Declaration of Completion No. <insert declaration number**> dated <**insert declaration of completion date**>, and its installation process has been inspected, assessed, and tested by <**insert name of accredited inspection body**> in accordance with NZS 4512:2021, and on the basis of the results, there are reasonable grounds to certify compliance with the standard.**		
Name of accredited inspection body		
Contact details of accredited inspection body		
Name of authorised signatory		
Signed on behalf of accredited inspection body	Date:	
Accreditation body endorsement		

NOTE –

(1) This certificate remains the property of <insert name of accredited inspection body> and may be withdrawn if the system ceases to comply.

(2) We have listed the Fire Safety Design Report and Specification presented as part of the designer's submission. We do not warrant that this documentation is the version under which the Building Consent was uplifted. If relying on this certificate for the purposes of issuing a Code Compliance Certificate as required by the Building Act, the user should check to see that this documentation matches the building consent.

(3) Ongoing compliance with the standard requires that the fire alarm system is routinely tested, serviced, and maintained.

(4) Any alteration or extension to the building, or changes in occupancy or storage practice may necessitate alterations to the system and resubmission for approval.

(5) This certificate shall only be reproduced in full.

APPENDIX P – NOTIFICATION FORMS – FIRE ALARM ISOLATION

(Normative)

P1 General

Guidelines for the precautions to be taken when a system is rendered inoperative, either in whole or in part, are found in section 7.

Depending on the extent or duration of system impairment or isolations, forms and notices are provided in this appendix to ensure the notification and authorisation of all isolations, and to guide the process of escalation and reinstatement:

(a) Figure P1 provides a form ('Form P1') for the notification and authorisation of system shutdowns;

(b) Figure P2 provides a system impairment notice ('Notice P2') for short-term or smaller isolations;

(c) Figure P3 provides a significant impairment notice ('Notice P3') for long-term or larger isolations.

Any active Notice P2 or Notice P3 on a system shall be recorded in every monthly or annual test report until the system has been fully reinstated (see 6.2.7).

All Notices P2 or P3 expire on the expected date of reinstatement or after 60 days (two-monthly test cycles) from their date of issue, whichever occurs first, and then need to be reissued and reauthorised using Form P1 to confirm the ongoing acceptability of the system's impaired status.

NOTE –

(1) Where the system being isolated is a necessary part of the fire safety requirement for the building under a building consent, the building should not be occupied in the affected areas during the period of isolation unless compensatory fire precautions are taken. Section B of Form P1 provides a range of suggested precautions.

(2) Such compensatory precautions may also be appropriate for situations where a building consent is not required.

(3) The company undertaking isolation and repair work may be different to the company contracted to undertake regular testing and may therefore impact their ability to meet compliance schedule requirements.

(4) Notices P2 and P3 are required to be affixed to the main control or indicating unit so that the presence and extent of any impairment is readily apparent onsite.

P2 Fire protection system shutdown notification and authorisation (Form P1)

Form P1 (see Figure P1) shall be completed and authorised for all programmed or planned work or isolations on any fire protection systems that will render any part of the system inoperative. ➤

A new Form P1 shall also be completed and authorised whenever an impairment notice expires, or an impairment notice (Notice P2) is escalated to a significant impairment notice (Notice P3).

P3 Fire alarm system impairment notice (Notice P2)

Notice P2 (see Figure P2) shall be completed and affixed to the main control or indicating unit when temporary, short-term isolations or impairment of the fire alarm system is undertaken and where impairment of the system is expected to last no more than 60 days (two-monthly test cycles).

This notice is limited to isolation or impairment of a maximum of one zone or no more than 10% of the entire system.

Larger isolations or impairments affecting multiple zones, or more than 10% of the entire system, or expected to last more than 60 days, shall use Notice P3.

P4 Significant impairment notice (Notice P3)

Notice P3 (see Figure P3) shall be completed and affixed to the main control or indicating unit in instances of larger system isolations, multiple impairments or isolations, or system impairments of more than 60 days (two monthly test cycles).

Where an existing impairment Notice P2 or P3 has been in place for more than 60 days, a new significant impairment Notice P3 shall be issued and renotified and reauthorised Form P1 as part of the escalation process.

Fire Protection System Shutdown (Form P1)			
Form from			Date / /
Building name			
Contractor			
Contractor details	Phone number	Email address	
To	Building owner		
	FENZ	Insurer/Broker	

Instructions: At least 24 hours notification of all programmed isolations shall be given in writing to FENZ and the building owner prior to a system being rendered inoperative. If an emergency compels immediate action to render a system inoperative, such notification shall be given as soon as possible thereafter.
NZ Standard 4541 and 4515 (Sprinkler Systems) and NZS 4512 (Fire Alarm Systems) require Sections A and B to be completed prior to a fire sprinkler or alarm system shutdown and sent to the following: 1) FENZ or their agents, and 2) Building owner or their agent. Section B requires 'OWNER'S APPROVAL' and for the owners to notify their insurers if the systems are isolated for more than 12 hours.

Note: **Partially isolated systems** – If a section or zone of a fire sprinkler/fire alarm system is isolated, blanked off, or left impaired whilst the main system is restored, a tag label shall be attached to the main sprinkler stop valve/control unit indicating which sections are affected. Building owners must inform FENZ and their insurers that the system has been partially restored. They must also inform FENZ and their insurers when the isolated sections have been restored.

OWNER (or agent) Please sign your approval of this shutdown in Section B of this form and send to your Insurers/Broker/Agent

Building owner's email:	Date / /		
FENZ email:	Date / /	Insurer/broker's email:	Date / /

Section A	**Fire system/building/site details**	**PFA No**
Building name		
Building street address		
Building occupancy		
Number of occupied floors		

Type of system			
Fire sprinkler system NZS 4541 ☐	Sprinkler pumps ☐	Fire sprinkler system NZS 4515 ☐	
Water supply ☐	Fire alarm ☐	Fire hydrants in buildings NZS 4510 ☐	
Fire alarm system NZS 4512 ☐	Automatic fire detection ☐	Heat detectors ☐	Smoke detectors ☐
Areas or zones affected:			
Alarms monitored by:			

Shutdown			
Shutdown date start / /	Shutdown time	System will be reinstated daily	Continuous shutdown for days
Reinstatement date / /	Reinstatement time		

Section of system left isolated whilst main system restored	**Area or zone to be isolated:**		
	Date due for completion / /	Date completed whole system restored / /	
Work to be completed during shutdown	Alterations ☐	Repair / replace damage to system ☐	Routine maintenance work ☐
	Other:		

Please use this form to notify your 'BUILDING INSURERS' of all shutdowns, reinstatements and of any sections of a system left isolated.

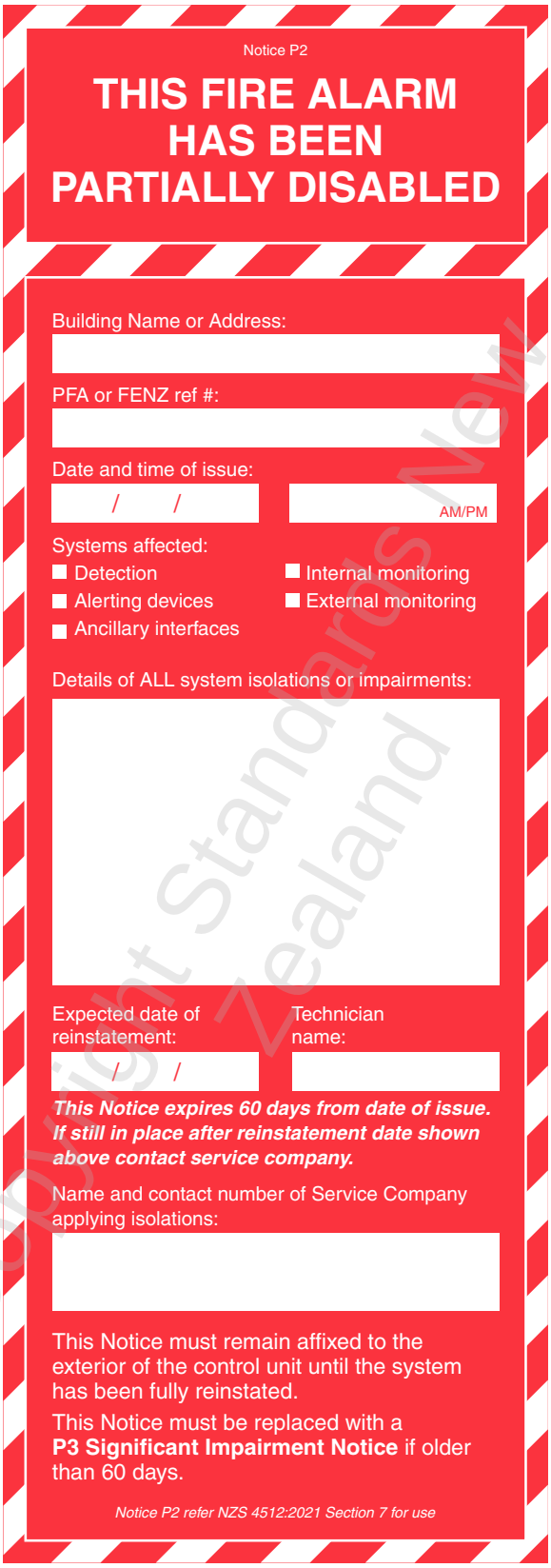
Figure P1 – Typical form for notifying that an installation is to be rendered inoperative (Form P1)

Section B – Owner's approval		
Date / /	Name	Insurer(s) to be notified YES ☐ NO ☐
Time	Signature	Date / /
Note: Failure by the owner to notify insurer(s) of an impairment or partial isolation of sprinkler installation may void insurance cover.		

Owner's safety precautions to be taken during fire system shutdown	
	Forbid smoking in the area affected by the fire system shutdown.
	No hot work during shutdown.
	Where sprinklers are installed ensure they are operative.
	Ensure all fire and smoke control doors are closed.
	Ensure alarm company can re-establish alerting devices if required.
	Where other systems (lifts, air conditioning) are affected by shutdown, manual controls need to be checked.
	Ensure building occupants know they must dial '111' for FIRE.
	Detail Fire Wardens to patrol affected areas (one person per 1000 m^2).
	Stop hazardous processes.
	Notify all staff and contractors working on site of the impairments.
	NOTE: If your building has smoke detectors be aware that dust, heat, and fumes from building work may activate your fire alarm.

Service company name	Telephone number	Email address
Contact name for any queries	Telephone number	Cell phone

Figure P1 – Typical form for notifying that an installation is to be rendered inoperative (Form P1) (continued)



NOTE – Colour of notice should be red background with white spaces for lettering.

Figure P2 – Typical notice of system impairment (Notice P2)

NOTE – Colour of notice should be red background with white spaces for lettering.

Figure P3 – Typical notice of significant system impairment (Notice P3)

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MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand Government