



Fire alarm systems in buildings

NZS 4512:1997

Superseded

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RELATED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

NZS 2139:1967	Specification for heat actuated fire detectors
NZS 3000:1997	NZS Wiring rules
NZS/BS 5252:1976	Framework for colour co-ordination for building purposes
NZS 6401:1973	PVC-insulated cables for electric power and lighting
NZS 7702:1989	Specification for colours for identification, coding and special purposes

AUSTRALIAN STANDARDS

AS 1159:1988	Polyethylene pipes for pressure applications
AS 1603.8:1996	Multi-point aspirated smoke detectors
AS 1851.10: 1989	Emergency warning and intercommunication systems
AS 1939:1990	Degrees of protection provided by enclosures for electrical equipment
AS 2220:- - -	Emergency warning and intercommunication systems in buildings
Part 1:1989	Equipment design and manufacture
Part 2:1989	System design, installation and commissioning

BRITISH STANDARDS

BS 2011:- - -	Environmental testing
Part 2.1Ca:1977	Test Ca. Damp heat, steady state
BS 5445:- - -	Components of automatic fire detection systems
Part 7:1984	Specification for point-type smoke detectors using scattered light, transmitted light or ionization
BS 5839:- - -	Fire detection and alarm systems for buildings
Part 2:1983	Specification for manual call points
BS 6221:- - -	Printed wiring boards

BS EN 60068-2 Test methods
BS EN 60068-2-1:1993 Tests A. Cold
BS EN 60068-2-2:1993 Tests B. Dry heat
BS EN 60068-2-6:1996 Vibration (sinusoidal)
BS EN 60651:1994 Specification for sound level meters

**NEW ZEALAND ELECTRICAL CODES OF PRACTICE (MINISTRY
OF COMMERCE)**

NZCEP 28 Selection and installation of cables

UNDERWRITERS' LABORATORIES INC.

UL 268:1989 Smoke detectors for fire protective signalling
systems

IEC STANDARDS

IEC 1000:- - - - Electromagnetic compatibility
Part 4-3:1995 Part 4: Testing and measurement techniques
Section 3: Radiated, radio-frequency,
electromagnetic field immunity test

NEW ZEALAND LEGISLATION

Building Regulations 1992
Electricity Regulations 1997
Fire Safety and Evacuation of Buildings Regulations 1992
New Zealand Building Code (Schedule 1 of New Zealand Building
Regulations 1992)
Radiocommunications (radio) Regulations 1993
The Building Act 1991

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FOREWORD

This Standard is a revision of NZS 4512:1994 and provides a specification for alarm systems in buildings intended to be operated in the event of fire. It deals with several issues of detail and clarification arising from use of the revised Standard and also introduces several substantive changes to reflect shifts in technology. These include recognition of aspirating smoke detection technology, and the increasing use of software control in fire alarm system design. As well, the current concept of a “non-monitored manual fire alarm system” is replaced by a “single zone fire alarm system”, reflecting the fact that a high degree of reliance is placed on all types of fire alarm systems used for Building Code compliance.

To enhance the reliability of fire alarm systems generally, changes have been made to the mandatory testing and maintenance requirements.

To ensure that fires are consistently detected well before life safety thresholds are reached, some detector spacings are reduced.

To allow time for the development and approval of new equipment and contracts, the changed or new provisions and requirements of the following clauses will not become effective until twelve months from the date of publication of this standard:

205.4, 205.5, 207.1, 208.3, 212.6 (a), 218.6, 218.9, 223.2, 225, 402.2 (c), 402.2 (o).

The terms “normative” and “informative” are 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, whereas an “informative” Appendix is only for information and guidance.

REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6020.

NEW ZEALAND STANDARD

FIRE ALARM SYSTEMS IN BUILDINGS

PART 1 GENERAL

101 SCOPE

101.1

This Standard specifies requirements for fire alarm systems in buildings. It is applicable to design, installation, extension, modification, commissioning, testing and maintenance.

101.2

This Standard provides for fire alarm systems of the following types:

- (a) Single zone (manual or automatic);
- (b) Multizone (manual or automatic).

101.3

Equipment 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.

102 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.

103 DEFINITIONS

103.1

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

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 wired on a common zone circuit.

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.

APPRAISAL CERTIFICATE. A certificate, which confirms 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 accredited by a certification body which is itself accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) to operate a laboratory accreditation programme, are deemed to satisfy this requirement.

AUDIBLE ALARM. A sound signal produced by a bell, gong, siren, buzzer or similar device indicating an alarm condition.

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AUTOMATIC FIRE ALARM SYSTEM. A fire alarm system which can automatically initiate an alarm in response to a fire.

DECLARED FUNCTIONAL REQUIREMENTS. The purpose or purposes from those listed in the Standard intended by the owner to be performed by the fire alarm system.

DEMARCATIION POINT. The place of first termination of a transmission circuit after entering a building, as designated by the telecommunications service provider.

DETECTOR. A device that operates automatically at predetermined conditions associated with fire and which initiates a fire alarm.

ASPIRATED SMOKE DETECTOR. A smoke detector having an aspirator mechanism to induce airflow via the pipe network into the detection chamber.

FLAME DETECTOR. A detector designed to operate in response to the occurrence of flame.

HEAT DETECTOR. A detector designed to operate when the temperature at the detector exceeds a predetermined value.

LINE TYPE DETECTOR. A detector in which the sensitive element extends along its length.

POINT TYPE DETECTOR. A detector in which the sensitive element is a compact unit of small area.

RATE OF RISE DETECTOR. A detector designed to operate when the rate of temperature rise at the detector exceeds a predetermined value.

SMOKE DETECTOR.

- (a) Ionization type responds to the presence of gaseous or invisible products of combustion causing a change in ionization currents within the detector.
- (b) Optical type responds to the scattering or absorption of light by suspended particles.

NOTE – More than one of the above definitions 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.

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 and energy sources. Where the system is remote connected, it will also include remote signalling devices.

INDICATING UNIT. Equipment incorporating devices for indicating the zone (or sector on a sector indicating unit) where an alarm has originated.

MANUFACTURER. Unless specifically stated otherwise the company which either manufactures or imports the control unit of a fire alarm system and is responsible for designating types and makes of components which may be connected to the control unit and the correct method of connection.

MANUAL CALL POINT. A manually operated device which 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.

MULTIZONE FIRE ALARM SYSTEM. A fire alarm system where detectors and/or manual call points are located in more than one zone.

NEW ZEALAND BUILDING CODE (NZBC). Refer Related Documents.

PNEUMATIC FIRE ALARM SYSTEM. A fire alarm system operated by compressed air or other gases.

REMOTE RECEIVING CENTRE. A monitoring centre for taking immediate action as a result of a fire alarm and/or other off-normal signals.

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.

SYSTEM TYPE. A generic description of a complete fire alarm system comprising a control unit and including the specific make and models of specialized components, types of common components, correct form of interconnection and installation and all other matters that are not unique to an individual installed system.

VISUAL ALARM. A steady or flashing visual indication of an alarm condition.

ZONE. An area uniquely defined by the equipment to assist in searching for a fire.

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.

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.

103.2

The following terms shall have the meanings as provided by the New Zealand Building Code.

Fire cell

Fire door

Fire resistance rating.

103.3

For the purposes of this Standard the word “shall” refers to practices which are mandatory for compliance with this Standard, while the word “should” refers to practices which are advised or recommended.

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104 DECLARED FUNCTIONAL REQUIREMENTS

104.1

In order to establish which requirements of the Standard apply to a particular fire alarm system, the intended functions of that system as specified in (a) to (g) below, shall be nominated by the owner as the system's declared functional requirements having regard to all regulatory, contractual, insurance or other obligations:

- (a) To transmit an alarm to summon NZ Fire Service assistance;
- (b) To monitor, and signal to a remote location, the presence of faults;
- (c) To automatically operate alerting devices;
- (d) To indicate the zone of an operated detector or manual call point;
- (e) To initiate certain ancillary fire related functions specified by the owner;
- (f) To transmit an alarm to summon some other specified emergency fire related assistance;
- (g) To detect very low levels of smoke, pre-combustion aerosols or other fire related phenomena specified by the owner.

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

105 COMPLIANCE

105.1

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, trained personnel, who have access to all relevant technical instructions published by the manufacturer. Design, installation and commissioning personnel qualified to the applicable industry training programme recognized by the New Zealand Qualifications Authority shall be deemed to satisfy the requirement to be competent and trained.
- (b) Be in conformity with the manufacturer's instructions;
- (c) Be in conformity with all other requirements of this Standard.

105.2

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.

105.3

It is necessary for continued compliance with this Standard that the fire alarm system be inspected, tested, repaired and maintained in accordance with the requirements specified herein.

105.4

A fire alarm system installed in compliance with any Standard then current which subsequently was superseded by this Standard, 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 surveyed in accordance with this Standard;
- (c) Any deficiencies found as a consequence of (b) are put right; and,
- (d) Any alterations to the fire alarm system comply with this Standard to the extent permitted by the technology of the original system.

105.5

Although it may be technically feasible to interchange components of one system type with other components this is not permissible unless such options form part of the manufacturer's published instructions.

106 STATUTORY REGULATIONS

106.1

Attention is drawn to the need to comply with all relevant statutory regulations, including the requirements of the Building Regulations, Electricity Regulations, the Radiocommunications (radio) Regulations, the Fire Safety and Evacuation of Buildings Regulations and the By-laws of the local territorial authority within whose jurisdiction the building is located.

107 WORKMANSHIP

107.1

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

108 RELIABILITY

108.1

The construction of all built-up equipment must be carried out with high inherent reliability as the major objective. Fire alarm systems operate continuously in wide temperature and humidity variations.

PART 2 DESIGN AND CONSTRUCTION – MULTI ZONE FIRE ALARM SYSTEMS

201 TYPE AND FUNCTION

201.1

The intended function of any particular fire alarm system shall be that declared by the owner from the list of functional requirements in 104.

201.2

Fire alarm systems are required to indicate automatically, the existence of those malfunctions listed in 208.

201.3

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

201.4

Additionally the alarm system may be used to initiate ancillary functions as explained in 203.1.

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

202 ZONES

202.1

To assist in locating a fire or other cause of alarm initiation it is necessary to divide the premises into zones. All the detectors and manual call points in one zone shall be associated with the one indicator on the zone control unit.

203 ANCILLARY SERVICES

203.1

The zone 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 functions such as the actuation of ventilating systems, emergency lighting, lift control, or other building services.

203.2

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.

203.3

Voltages in excess of 32 V a.c. (r.m.s.) and 50 V d.c. associated with ancillary services shall not enter the control unit.

203.4

The fire alarm system shall not be used to monitor the functioning or failure of any element of the ancillary services. Indicators in accordance with 210.5 and serviceperson's isolate switches only are acceptable.

204 FIRE ALARM

204.1

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

- (a) Alerting devices in the building; and
- (b) A visual indication on the zone indicator 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;
- (d) The foregoing requirement shall be optional in respect of detectors installed additional to the basic coverage, to initiate supplementary actions.

204.2

The fire alarm as given by 204.1(b) and (c) shall continue in operation until manually reset. Resetting facilities shall be in accordance with 206.2.

204.3

Where there is a provision for alerting by zones (for staged evacuation), facilities must be provided on the zone control unit to allow manual activation of alerting devices in all zones.

204.4

The visual signal specified in 204.1(b) shall also be given on any repeater indicating unit which may be provided to suit fire brigade access.

204.5

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 the fire microphone. (See 218.8.)

204.6

The operation of a manual call point for a period greater than 1 s shall cause the system to latch into the fire alarm condition.

204.7

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.

204.8

An alarm verification facility may be provided whereby a point type smoke detector circuit must operate twice before a fire alarm is signalled. Upon the first operation, the detector circuit shall be held reset for a period not exceeding 15 s. During an ensuing period of not more than 120 s, further detector operation shall signal a fire alarm without further delay. In this instance the delay of 204.7 is measured from the second operation.

204.9

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.

204.10

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

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204.11

A fire alarm shall override any defect warning signal specified in section 208.

204.12

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

205 SILENCING SWITCHES

205.1

The fire alarms as specified in 204.1(a) shall continue to operate until either the system is restored to normal or a silencing switch is operated.

205.2

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.

205.3

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 in the normal operational condition.

205.4

The switch outside the cabinet shall be operable only by a "Bulgin 6083/C" patterned key and shall be located on or adjacent to the cabinet and be clearly designated "SILENCE ALARMS. BRIGADE USE ONLY". Operation of this switch shall not prevent the operation of the alerting devices by any other source.

205.5

Any other system (e.g. sprinkler DBA) which 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. Also, operation of this switch shall not generate a defect warning via the fire alarm system.

206 MANUAL RESET FACILITIES

206.1

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

206.2

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.

207 EVACUATION SWITCH

207.1

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 but may also fulfil the requirements of 204.3. The switch shall be labelled "EVACUATION".

208 DEFECT WARNING

208.1

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

- (a) When the average cell voltage (measured with quiescent load current and without assistance from the battery charger) falls below 2.03 V in the case of an unsealed lead acid battery and 1.2 V for a Leclanche cell. For other battery types the voltage should equal the 50 % capacity value measured at the quiescent load;
- (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 unless the condition exactly reproduces the effect of the operation of a detector or call point;
- (c) Absence of any plug-in zone circuit board or relay that control the alerting devices;
- (d) Operation of the silencing switch outside the control unit cabinet;
- (e) Abnormally high or low impedance condition (e.g. an open or short circuit) on the circuit wiring to alerting devices (including wiring to loud speakers);
- (f) 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;
- (g) Repeated failure of a watchdog to re-start a software program;
- (h) Failure of a software configuration to pass the data check procedures (see 225.2);
- (j) Failure or deterioration of any monitored aspect of an aspirated smoke detector or system;
- (k) A fault condition on an associated EWIS system.

208.2

A defect warning shall be given by a visual indicator on the zone indicator 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 the control unit.

208.3

The delay in equipment response to the occurrence of a defect condition shall not exceed 60 s.

208.4

The defect warnings shall automatically cancel on removal of the defect.

208.5

The audible device specified in 208.2 used for giving a defect warning shall be distinctive and of a different character from the audible fire alarm signal.

208.6

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.

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209 MANUAL ISOLATION FROM REMOTE RECEIVING CENTRE

209.1

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.

210 INDICATORS

210.1

Indicators shall be lamps, shutters, LEDs, LCDs, message screens, or other suitable devices appropriate to the system.

210.2

Where incandescent filament lamps are used for fire indication, each indicator shall consist of 2 lamps connected in parallel; the failure of either lamp must be evident during routine testing.

210.3

The operation of one indicator shall not prevent the proper and separate operation of indicators of a minimum of 4 other zones.

210.4

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

210.5

Zone control units shall incorporate:

- (a) A fire alarm indicator for each zone, coloured red; and
- (b) A common defect warning indicator, coloured amber; and
- (c) A common normal condition indicator, coloured green.

Supplementary alarm indicators from associated system function (e.g. sprinkler flow switch) shall be coloured red.

Ancillary-services-operated indicators, where required, shall be coloured amber.

All indicators shall be clearly labelled.

210.6

Indicators on indicating units, whether forming part of a zone control unit or not, shall when operated, clearly and unambiguously indicate their function at a viewing distance of 2 m. The minimum height for associated lettering shall be 3 mm. Where indicating units are physically separate from the zone control unit the indicators on the zone control unit need not comply with the 2 m viewing requirement.

211 ELECTRICAL SUPPLY

211.1

The supply to the control and indicating equipment shall consist of either a mains powered battery charger and a rechargeable battery or alternatively a non-rechargeable battery which may be provided

with a mains 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 Regulations even when the cabinet door is open. The voltage at which the control and indicating equipment operates shall not exceed 50 V d.c. or 32 V a.c.

NOTE - This is not intended to preclude the use of industry standard signalling voltages such as the 100 volt line levels commonly used to drive loudspeakers. Where such voltages are used, the installation and servicing must comply with the Electricity Regulations.

211.2

Alerting devices and multi-point aspirated smoke detection systems may be powered either:

- (a) From the same battery as the control and indicating equipment, or
- (b) From an independent battery supply provided that each battery supply is independently monitored in accordance with section 208, and any rechargeable battery has its own charger in accordance with section 212.

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.

211.3

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

211.4

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

211.5

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

NOTE – For the purposes of this Standard the nominal voltage is defined as 2 V for lead acid cells and 1.3 V for Leclanche cells.

211.6

Complete failure of the electrical power supply to the zone control unit shall initiate a fire signal. Fire shall be signalled when the voltage is less than 80 % of the nominal system operating voltage. (See Note to 211.5.)

NOTE – See A4 of Appendix A regarding power supplies for transmitting devices.

212 BATTERY CHARGER

212.1

The charger for a rechargeable battery shall be capable of restoring the capacity stated in 213.1 within a period of 24 h while carrying any non-alarm load normally supplied by that battery.

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.

212.2

The charger is not required to carry any of the alarm load.

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212.3

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

212.4

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

212.5

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 manufacturer.

212.6

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.
- (b) An extended test period to check battery capacity. This test shall inhibit the battery charger current for a duration between 30 min and 90 min. The interval between these 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 208.1(a).

213 RECHARGEABLE BATTERIES

213.1

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 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 30 min.

213.2

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

213.3

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.

213.4

The battery shall be suitable for continuous operation under float charge conditions and shall meet the requirements of section 221.

213.5

The battery shall be designed for stationary use and a minimum service life of 5 years.

213.6

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.

214 NON-RECHARGEABLE BATTERIES

214.1

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

215 CONSTRUCTION OF CONTROL AND INDICATING EQUIPMENT

215.1 Construction

Cabinets shall be designed and constructed to meet the requirements of 108.1 and provide:

- (a) Adequate strength and rigidity;
- (b) Protection from dust or other foreign materials which would adversely affect the operation of the equipment;
- (c) Adequate access for maintenance purposes;
- (d) Access by key. This key shall be common to all systems installed by a manufacturer.
- (e) 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.

215.2 Manual controls

215.2.1

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

215.2.2

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

215.3 Internal wiring

215.3.1

Conductors shall have adequate current carrying capacity and mechanical strength.

215.3.2

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

215.3.3

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 minimized.

215.3.4

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

215.3.5

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

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215.3.6

All connections shall be of a standard that meets the reliability requirements of 108.1 (for example, soldered, wire wrapped).

215.4 Printed circuit boards

Printed circuit boards shall be designed and manufactured in accordance with BS 6221.

215.5 Electrical components

215.5.1

Lamps having 2 filaments in one envelope shall not be used.

215.5.2

All friction contact surfaces shall be of a noble metal or its equivalent. If the surfaces are plated or flashed with gold, the coating shall have a minimum thickness of 0.004 mm. In any case the surface shall be sufficient to withstand normal maintenance and servicing requirements.

215.5.3

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

215.6 Circuit design

215.6.1

Circuits shall be designed so that the control and indicating equipment will perform all its functions under the test requirements of section 221.

215.6.2

Wire-wound resistors over 33 k Ω shall be continuously operated at not less than 10 % of the manufacturer's normal rating for power dissipation. Wet electrolytic capacitors shall be continuously operated at not less than 20 % of the manufacturer's working d.c. voltage rating. All other components shall be operated below 80 % of the manufacturer's maximum rating for power dissipation, voltage or current.

215.7 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.

216 DETECTION SYSTEM

216.1

Point type heat actuated detectors shall comply with NZS 2139.

216.2

Multi-point aspirated smoke detectors and the associated aspirating system hardware shall comply with Part 8 of AS 1603. Other smoke actuated detectors shall comply with UL 268 or BS 5445:Part 7.

216.3

Where a detector utilizes a mechanical contact to initiate a fire alarm that contact must be closed in its normal condition, opening to initiate the fire alarm.

216.4

With all detectors or allied devices connected to the zone terminals of the control unit, but without any building wiring, a 50 k Ω resistance placed across the circuit shall neither prevent a fire being signalled nor initiate a fire signal.

216.5

The detection system shall not initiate a fire alarm in response to a decrease in the ambient temperature.

216.6

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.

217 MANUAL CALL POINTS

217.1

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

218 ALERTING DEVICES

218.1

All devices shall be rated for 1 h continuous use. Electrical devices shall function satisfactorily within $\pm 20\%$ of the nominal battery voltage.

218.2

For positions exposed to the weather the devices shall have a degree of protection to IP24 of AS 1939.

218.3

Colour finishing of the visible sections of alerting devices shall be red and approximate with shade No. 537 of NZS 7702 or colour 04 E 53 of NZS/BS 5252. For recessed devices a label with the words "FIRE ALARM" of the same shade shall be provided.

218.4

Visual alerting devices shall:

- (a) Be either coloured red or incorporate a white strobe with the word "FIRE" coloured red illuminated;
- (b) Be visible throughout 180°;
- (c) Pulse a light at a rate between 0.5 Hz and 5 Hz.

If incandescent filament lamps are used, the light shall consist of 2 lamps connected in parallel. The failure of either lamp must be evident during routine testing.

218.5

Labelling shall be clear and permanent and shall include details as follows:

- (a) Alerting device manufacturer's name, trade name or trademark and type;
- (b) Nominal electrical characteristics, for example the operating voltage and current.

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218.6

The audible alerting device may incorporate loud speaking voice facilities in order to provide opportunity for, or better means of, evacuation control and testing. Where an EWIS system is used to provide the alerting devices, the equipment shall comply with AS 2220.1 provided that the d.c. power supply system and battery capacities also comply with this Standard (see sections 211 to 214). The Evacuation and Brigade Silence Alarms switches (207.1 and 205.4) shall control the EWIS system.

218.7

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

218.8

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

- (a) The fire alarm signal 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 (c);
- (c) The system may, if required, be fitted with an additional microphone for fire purposes designated as "fire microphones". This microphone shall only be operable after the fire alarm system has been activated and shall be fitted with a self restoring "press to talk" switch. (This limitation on the availability of the fire microphones 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 211.2;
- (e) The circuit wiring to the system loud speakers shall be monitored for defects (see also 208.1 (e)).
- (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 be subjected to the environmental test requirements of section 221.

218.9

Any other fire protection system that complies in all respects with the requirements of the published technical standard for such systems 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 2 systems shall be supervised by the fire alarm system, and a defect warning shall be provided in the manner of 208.1 (b).

218.10

If the alerting devices are used for other purposes (e.g. school class change) the following additional conditions shall be satisfied:

- (a) The fire alarm signal shall be easily distinguishable from all other signals (e.g. by sound character, cadence, or continuous sound);
- (b) The fire alarm signal shall take priority over and override all other signals;
- (c) The battery charger and batteries shall be adequately sized to account for the additional working load.

219 PNEUMATIC SYSTEMS

219.1

Pneumatic systems shall comply with all other parts and clauses where relevant and shall also comply with the additional requirements of this section.

219.2

The gas storage vessel shall be of corrosion resistant construction and shall withstand a pressure test of twice normal working pressure.

219.3

To facilitate routine testing, permanently connected pressure gauges shall be incorporated at the gas storage vessel and also at the manifold where these are not co-located.

219.4

Systems shall be charged with clean, dry, non-flammable gas.

219.5

The quantity of stored gas shall be not less than 85 L, plus 1 L for each zone, measured at normal temperature and pressure.

219.6

Means shall be incorporated whereby routine tests can be carried out to prove the satisfactory operation of the system functions.

219.7

Tubing shall comply with the following requirements:

- (a) When wound on a mandrel of radius 4 times the tube inside diameter the tube diameter shall not be reduced by more than 20 % at 20 °C. The tube shall not exhibit visible cracking when subjected to this bend and shall withstand the pressure test of (b).
- (b) The tube shall withstand a pressure of test of 3 times the operating pressure of the system;
- (c) The internal and external diameters of the tube shall be held to within ± 20 % of the nominated diameters.

219.8

Pneumatic circuits shall be looped so that a single obstruction in any circuit with detectors or manual call points shall not prevent any detector or manual call point from initiating a fire alarm as specified in 204.1.

219.9

The normal circuit pressure shall not exceed 300 kPa gauge and the system shall withstand a pressure test of twice the normal working pressure.

219.10

The operation of any detector or manual call point on a pneumatic circuit shall initiate a fire alarm within 15 s.

219.11

The system shall initiate a fire alarm within 60 s when gas is allowed to escape via the full length of the circuit while the remainder of the system is in the normal working condition. For system evaluation test purposes the length of circuit shall be considered as 500 m with 25 detectors connected.

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219.12

A defect warning as specified in 208.1 shall be given when the quantity of stored gas is reduced to the 50 % point between the full storage capacity and the quantity (mass) at which the system signals fire. (See 219.13.)

219.13

The system shall initiate a fire alarm when the quantity of stored gas is reduced to a level where the manifold pressure equals the fire alarm initiating pressure of the detection and manual call point circuit.

220 ADDRESSABLE FIRE ALARM SYSTEMS

220.1

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 satisfied:

- (a) The zone 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.
- (b) The addressable system design shall incorporate fault tolerance such that a single short circuit or break anywhere on the addressable circuit between the zone 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 shall result in a defect warning signal, unless the condition exactly reproduces the effect of the operation of a detector or manual call point.

221 ENVIRONMENTAL TESTS

221.1 General

A sample of the control and indicating equipment shall be subjected to the following environmental tests made in accordance with BS 2011 or BS EN 60068-2. In order to take account of the conditions to which the equipment may be subjected in practice, the procedures specified in this Standard differ in certain respects from the procedures specified in BS 2011 or BS EN 60068-2. Where no specific information is given herein, the methods indicated in the appropriate parts of BS 2011 or BS EN 60068-2 shall be followed.

221.2 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 which 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.

221.3 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 221.5. If, during a test of 221.5 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 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 221.5.

221.4 Preconditioning and recovery procedure

Before and after each environmental test, the temperature of the control and indicator equipment shall be allowed to stabilize 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.

221.5 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 multizone control and indicating equipment, operation of another alarm circuit connected to a different zone from that in (a) above to ensure that the equipment functions correctly;
- (d) Operation of the switches which 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 fire signalling.

221.6 Inspection

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

221.7 Test procedure

For each environmental test specified in 221.8, the control and indicating equipment, in its quiescent condition, at the beginning of each of (a) to (g) shall be subjected to the following in the order in which they are listed:

- (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.

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221.8 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 ± 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 min averaged over a period of not more than 5 min.
- (b) Damp heat as in BS 2011 Part 2.1Ca. The equipment shall be introduced into a chamber which shall be maintained at a temperature of 40 ± 2 °C and a relative humidity of 90 % – 95 %. 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 ± 2 °C. While it is being adjusted the temperature in the chamber shall not change by more than 1 °C per min 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.
- (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 1 octave per min for each condition of the equipment in the functional tests described in 221.5.

221.9 Performance requirements

The equipment shall be considered satisfactory if:

- (a) No maloperation occurs during the environmental test; and
- (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 workmanship is revealed.

222 OPERATIONAL TEST

222.1 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.

222.2 Performance requirement

The equipment shall be considered satisfactory if the requirements specified in section 204 are met.

223 RADIATED RADIO FREQUENCY INTERFERENCE

223.1 Test procedure

The noise voltages produced by the control and indicating equipment during the functional tests (see 221.5) shall be measured. The equipment shall be considered satisfactory provided that the results of the tests comply with the relevant statutory requirements.

223.2 Radio frequency immunity

The control and indicating equipment shall be demonstrated to be immune to radio frequency interference according to IEC 1000-4-3. This shall be 80 MHz – 1000 MHz to test level 2 during the functional tests (see 221.5).

224 MARKING

224.1

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

224.2

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

224.3

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

225 SOFTWARE CONTROLLED EQUIPMENT

225.1 Program monitoring

225.1.1

The correct execution of the software by any processor shall be monitored 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.

225.1.2

In the event of a failure by a processor to correctly execute its software, the monitoring circuit shall attempt to re-start the program within 10 s of the occurrence of the failure.

225.1.3

Repeated unsuccessful attempts to re-start the program shall give a defect warning within 60 s of the occurrence of the failure.

225.2 Storage of software

225.2.1

All software necessary for the functions required by this Standard shall be held in solid-state memory.

225.2.2

The main operating software (firmware) shall be held in non-volatile, read-only memory, marked with a designation positively identifying its contents (e.g. program version).

Configuration data shall be safeguarded either as for firmware above, or shall be:

- (a) Modifiable only after access by lock or code at a level additional to that specified in 215.1(d);

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- (b) Changeable only then after a particular manual enabling action;
- (c) Protected from corruption due to abnormal operation or program execution;
- (d) Able to be clearly and unambiguously checked against hard copy documentation to reveal any undocumented or unauthorized alteration;
- (e) Preserved (by design) in the event of system power failure for a period of at least 10 years.

Run-time data may be stored in volatile memory. The equipment shall re-start in a safe, operational, and predictable manner after a failure of the power supply.

All firmware and configuration data shall be checked automatically (e.g. by “check-sum” procedure) at intervals not exceeding 72 h. A defect warning shall be given in the event of failure of these data checks.

PART 3 SINGLE ZONE FIRE ALARM SYSTEMS

301 FUNCTIONS, LIMITATIONS AND COMPONENTS

301.1

The intended function of any particular single zone fire alarm system shall be that declared by the owner in accordance with section 104.

301.2

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

301.3

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

- (a) Zone division and indication as per 202.1 and 204.1(b) is not required;
- (b) Unless a declared functional requirement, initiation of a fire alarm signal to a remote receiving centre as per 204.1(c) and 204.12 is not required – in which case:
 - (i) Isolation facilities as per 209.1 is not required;
 - (ii) Signalling of fire on complete electrical power failure as per 211.6 is not required;
 - (iii) Functional tests of 221.5(d) and (f) are not applicable.
- (c) The internal silencing switch required by 205.2 and 205.3 need not be provided.
- (d) A zone index and indicating unit as defined by 402.7 and 403.1 is not required.
- (e) The brigade access requirements of 403.2(a) is not applicable.

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PART 4 INSTALLATION

401 ZONES

401.1

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

- (i) 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
- (ii) Multi storeyed dwellings whether or not forming part of a multi-unit group of dwellings, may be regarded as a single zone provided there is not a common entrance with other dwellings

(b) Every ceiling or roof space in the building required to have detectors shall designate as one or more unique zones except where the ceiling forming the space wholly comprises removable tiles in which case the space may form part of the corresponding zone of the floor below and in calculating the area of that zone, the ceiling space shall be ignored.

(c) The maximum area per zone is 750 m².

401.2

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

401.3

The area defined by a zone is the nominated search area which is normally accessible from within the zone. Attached service rooms with external access may be included in the zone provided that:

- (a) Their aggregated area does not exceed 25 m²; and
- (b) They do not form part of another fire cell; and
- (c) They are not additional to the search area limit.

401.4

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

401.5

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

401.6

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 750 m² zone area and boundaries 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.

402 INSTALLATION PRACTICE

402.1

Cable shall comply with the requirements of NZS 6401 and shall either be sheathed in polyvinyl chloride or installed in conduit except that conductors may be solid or stranded.

402.2

Cable installation shall be in accordance with the following requirements:

- (a) With all outgoing and return conducting paths of any one circuit connected into each detector and manual call point of that circuit;
- (b) Protected against damage where installed on the surface and within 2 m of floor level, passing through walls, or in such other positions where it is likely to be damaged;
- (c) Outgoing and return conducting paths of alerting devices, including loud speakers, (which are required by 208.1(e) to be monitored) shall terminate on, or within each alerting device;
- (d) Installed in conduit where it is necessary to bury the cables in concrete or plaster;
- (e) 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 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";
- (g) Conductor cross-sectional areas shall be such that the voltage available at equipment shall be within the equipment rating and in no case less than 1 mm²;
- (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;
- (k) The insulation resistance between individual conductors and between each conductor and earth shall be greater than 5 MΩ;
- (m) Each zone circuit external to the control unit shall be separate and distinct, shall protect a definite section of the building, and shall be electrically separate from any other circuit;
- (n) Notwithstanding the above requirements, 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.
- (o) The cabling of transmission circuits from a zone control unit to the demarcation point for a fire alarm system connected to a remote receiving centre shall be run in fire rated cable, fire rated conduit, or a fire rated duct used solely for cabling and non-combustible services.

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402.3

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

402.4

Ancillary services as described in 203.1 shall be connected through isolating devices. The connection of this additional apparatus shall not adversely affect or prejudice the performance of the fire alarm system. Voltages in excess of 32 V a.c. and 50 V d.c. associated with remote control functions shall not enter the control unit.

402.5

The mounting shall be such that the control unit is not subjected to undue vibration or shock.

402.6

Fire alarm and defect warning indicators shall be labelled in accordance with 210.6.

402.7 Zone index

402.7.1

The location of the zones relative to the usual viewing position of the indicating unit shall be clearly defined by means of an index on the outside face of the unit.

402.7.2

The index shall include a diagram, which is correctly oriented relative to the viewing position, on which shall be shown:

- (a) The outline of the building by means of a solid line;
- (b) The main fire brigade access into the premises as an arrow across the outline or a gap in the outline;
- (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) Location of any other systems connected to the alarm system, e.g., gas flooding (see 218.9 and 401.6);
- (e) The location of the indicating unit, using the following symbol and the words "YOU ARE HERE".



The diagram shall be approved by the New Zealand Fire Service.

402.7.3

The requirement for the diagram may be dispensed with in the following circumstances:

- (a) In a building containing only one zone per floor and where the floor plan throughout is similar; and
- (b) Where the ingress to the building, all floors, and any special requirements are clearly apparent.

402.8

When the system is in the fire alarm mode the index shall be illuminated, so as to be clearly visible from the normal viewing position.

402.9

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

402.10

Terminals of electrical detectors shall be covered when installed.

402.11

Zone circuits shall be allocated an identifying symbol. Every detector, manual call point, junction box and end of line element shall be marked in a permanent manner in characters not less than 5 mm high with its zone symbol and the number indicating the numerical order in circuit beginning at the control unit. This marking shall be visible when the components are installed.

402.12

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

402.13

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

402.14

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.

402.15

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

402.16

Pneumatic systems shall comply with all other relevant parts and clauses and shall also comply with the following:

- (a) Excepting for fully welded joints, through-joints in tubing shall be enclosed in boxes accessible for inspection and maintenance purposes;
- (b) Tubing supports shall be corrosion resistant and spaced at intervals not exceeding 250 mm;
- (c) Tubing shall be protected against damage where installed on the surface and within 2 m of floor level, where passing through walls, or in other positions where it is likely to be damaged;
- (d) Tubing installed underground shall be suitably protected from mechanical damage;
- (e) Tubing installed overhead between buildings shall be suitably protected from environmental conditions, adequately supported, and relieved of stress;
- (f) Tubing shall be installed in conduit where it is necessary to bury the tubing in concrete or plaster;
- (g) The energy storage vessel shall be enclosed in a cabinet constructed in accordance with 215.1(a), (b), (c) and (d);

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- (h) The standard of workmanship and materials shall be such that the leakage rate shall not exceed that specified in 504.1(d);
- (j) Tubing shall not be installed with bends of radius less than 6 times the tube inside diameter.

403 EQUIPMENT LOCATION

403.1

Indicating units shall be located as follows:

- (a) To suit the fire brigade access arrangements;
- (b) Contained within the limits of 700 mm and 2300 mm from floor level;
- (c) Clearly visible from the normal viewing position;

NOTE – To assist fire fighting personnel the normal viewing position is usually external to the building (see also 406.10).

- (d) To minimize the effects of direct sunlight. (See 210.6);
- (e) With a minimum clearance of 1 m at the access doors for maintenance purposes;
- (f) Such that the equipment can be serviced in a weather protected environment;
- (g) To provide easy access to all control facilities;
- (h) To preclude malicious damage wherever practicable.

403.2

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

- (a) To suit the fire brigade access arrangements;
- (b) Contained within the limits of 700 mm and 2300 mm from floor level;
- (c) With a minimum clearance of 1 m at the access doors for maintenance purposes;
- (d) Such that the equipment can be maintained in a weather protected environment;
- (e) To provide easy access to all control facilities;
- (f) To preclude malicious damage wherever practicable;
- (g) Within a fire cell protected by the fire alarm system.

403.3

Battery chargers, batteries and the mains power supply switch shall be housed in a cabinet or cabinets constructed in accordance with 215.1(a), (b), (c) and (d). Adequate ventilation and protection from the corrosive effects of electrolyte shall be provided.

404 MANUAL CALL POINT LOCATIONS

404.1

There shall be at least one manual call point per normally accessible zone. Manual call points shall be located on each escape route and at the main exit doors. Additional manual call points shall be located elsewhere to ensure there is not more than 30 m travel to the nearest manual call point. In multilevel buildings there shall be a manual call point located on the escape route at each full floor landing.

404.2

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 1.2 m to 1.5 m above floor level and a clear space of 0.6 m shall be preserved in all directions.

404.3

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.

404.4

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 Service and the site is at times unattended such manual call points shall only be permitted if the site is secured against unauthorized access.

405 DETECTOR SELECTION, LOCATION, POSITION, SPACING AND COVERAGE

405.1 Selection

405.1.1

The protected premises shall be covered by detectors that are reliable and in particular respond to the normal phenomena arising at an early stage in a fire, that is, heat, smoke or flame. However the selected detector must not respond to ambient and environmental conditions typical of the location. Specialized detectors responding to other phenomena 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.

405.1.2

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

NOTE – Heat detectors that conform to NZS 2139 are colour coded according to operating temperature rating ranges as follows:

54.5 °C	–	60 °C	Blue
63 °C	–	68.5 °C	Red
74 °C	–	79.5 °C	Yellow
82.1 °C	–	104.5 °C	Green
107 °C	–	121 °C	White
> 121 °C			Black

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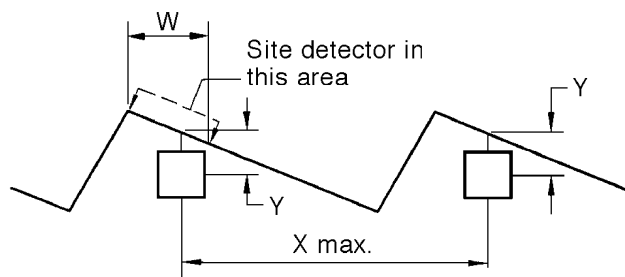
405.2 Location and position

405.2.1

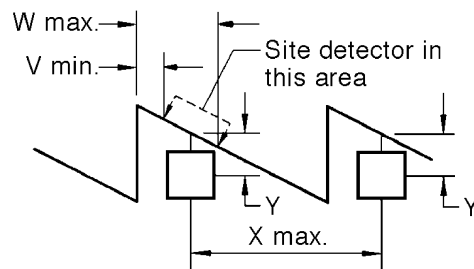
Detectors shall be installed in locations as follows:

- (a) All areas of the building, including rooms, halls, corridors, storage areas, basements, other subdivisions and accessible spaces;
- (b) Each subdivision where a space is subdivided by walls, partitions, or storage racks reaching within 300 mm of the ceiling except water closets which comply with the requirements of 405.2.2(e);
- (c) At the top of stairways, hoists and lift wells, service ducts, chutes, and above rope or belt openings; and skylights if used for ventilation or if having a volume greater than 3 m³;
- (d) On the floor landings of all stairways;
- (e) Within 1.5 m of a fire door where detection is not provided on both sides of the door;
- (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 figures 1 and 2;
- (g) Under fixed decks, ventilation ducts, mezzanine floors or landings which are more than 1.5 m wide;
- (h) Under loading dock canopies, over occupiable covered balconies, and under other external appendages where combustible material is stored, provided that in each case there is no dimension less than 1.5 m;
- (i) Under ducted hoods over cooking apparatus, with any dimension greater than 1.5 m, located adjacent to the extract point(s);
- (j) Within 500 mm of the apex of a roof or ceiling;
- (k) Not less than 1 m from air delivery points of air conditioning plant or ducting;
- (m) Not less than 200 mm from a wall;
- (n) Where open joists or beams are surmounted by floors or ceilings, detectors shall be placed between the joists or beams in sufficient quantity to meet the following requirements:
 - (i) Where the beam depth is less than 150 mm the spacing requirements of 405.3.1, 405.3.2 and 405.3.3 shall apply
 - (ii) Where the beam depth (D) to ceiling height (H) ratio D/H is between 0.05 – 0.1 the spacing shall be two-thirds of that required by 405.3.1, 405.3.2 and 405.3.3 (refer also figure 3)
 - (iii) Where the beam depth (D) to ceiling height (H) ratio is ≥ 0.1 each beam shall be treated as a wall (refer also figure 3)
 - (iv) If the ratio of beam spacing (S) to ceiling height (H) S/H is ≤ 0.4 , detectors shall be installed on the bottom of the beams and spacing of detectors shall be two-thirds of that required by 405.3.1, 405.3.2 and 405.3.3 (refer also figure 4).

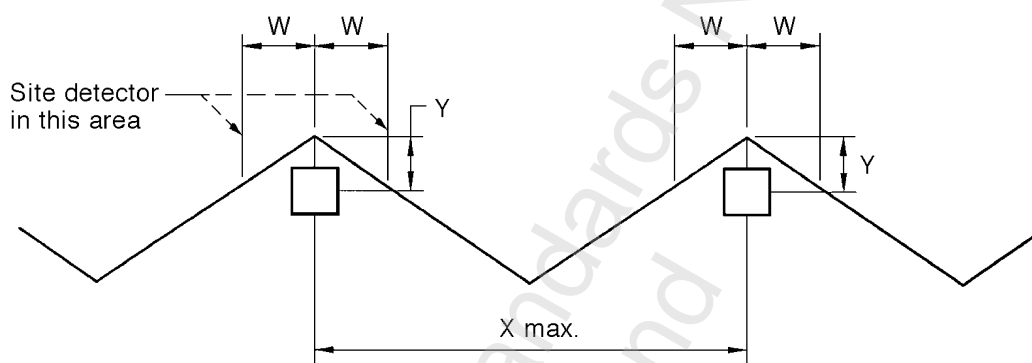
- (o) Such that the distance the sensing element is below the roof or ceiling underface is:
- (i) In areas with up to 10 m ceiling height:
 - (A) For heat actuated detectors, not less than 25 mm and not greater than 100 mm
 - (B) For point type smoke actuated detectors, not less than 25 mm and not greater than 250 mm
 - (C) For beam type smoke actuated detectors, not less than 300 mm and not greater than 600 mm.
 - (ii) In areas with ceiling 10 m to 20 m height, according to the manufacturer's data sheets.
- (p) In areas with ceilings exceeding 20 m in height detector selection, location and spacing shall be in accordance with specific fire engineering design that demonstrates detection equivalence, for a given fire size, as that provided on manufacturer's data sheets for situations lower than 20 m.
- NOTE – Additional detectors at intermediate levels will generally be required in areas exceeding 20 m in height.
- (q) 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 or the like;
- (r) All cleaners' and understair cupboards (refer also figure 5);
- (s) All wardrobes greater than 6 m³ and those which are smaller and not vented by an orifice greater than 0.02 m² (refer also figure 5);
- (t) Cupboards having a capacity exceeding 1.5 m³ and containing electrical switchboards, distribution boards, or in which electrical or gas fired appliances are used *in situ* (refer also figure 5);
- (u) Other cupboards that have a capacity of over 3 m³ unless vented at the top into the room by an orifice of not less than 0.02 m²; this exemption shall not apply to cupboards greater than 6 m³ (refer also figure 5).



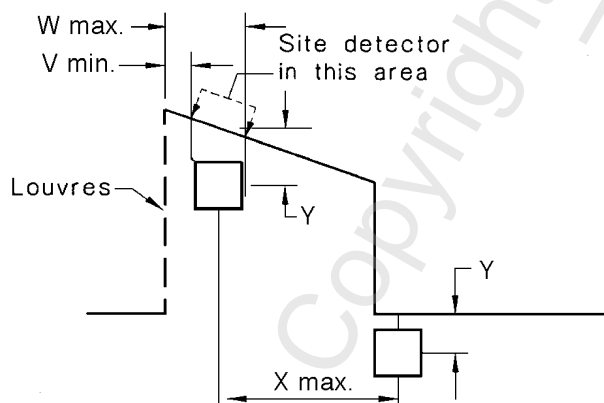
(a) Unequal sloping surface



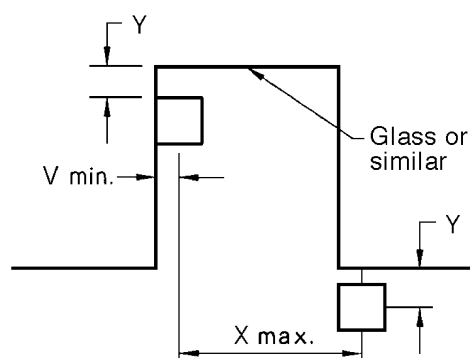
(b) Sawtooth ceiling, roof or surface



(c) Equal sloping surface



(d) Louvred ceiling or roof with louvred riser

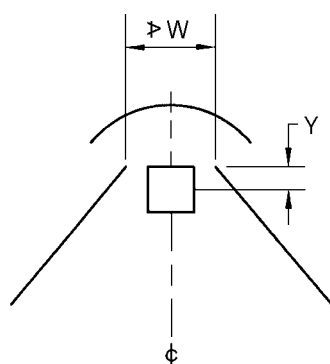


(e) Ceiling, roof or surface with skylight

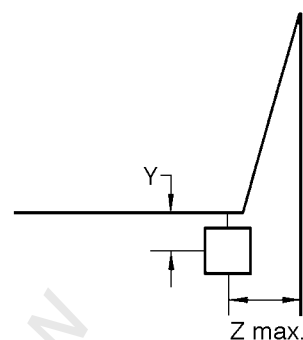
- V = Minimum distance from wall as per 405.2.1(m)
W = Maximum distance from apex as per 405.2.1(j)
X = Detector spacing as per 405.3
Y = Distance from ceiling or roof as per 405.2.1(o)
Z = Spacing from wall or partition as per 405.3

NOTE – Detector always on side with least slope.

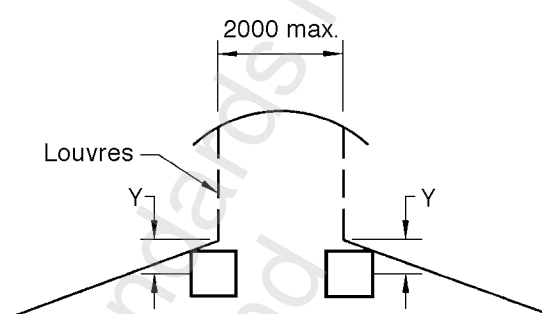
Figure 1 – Typical detector locations at apex of ceiling, roof or surface (refer 405.2.1(f))



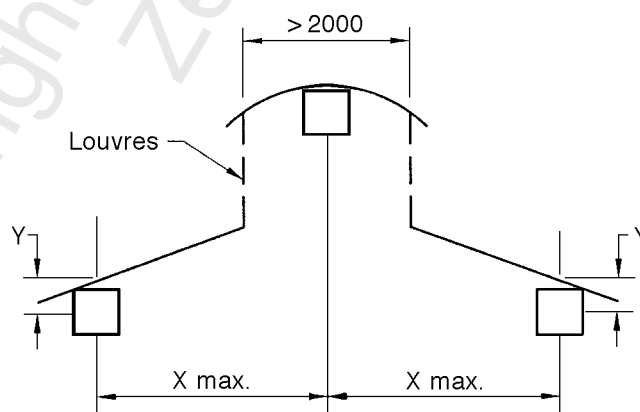
(a) Ventilated ridge



(b) Narrow apex



(c) Ventilated ridge (greater than W)



(d) Ventilated ridge (greater than 2000 mm)

- V = Minimum distance from wall as per 405.2.1(m)
W = Maximum distance from apex as per 405.2.1(j)
X = Detector spacing as per 405.3
Y = Distance from ceiling or roof as per 405.2.1(o)
Z = Spacing from wall or partition as per 405.3

NOTE – All dimensions in millimetres.

Figure 2 – Typical detector locations at apex of ceiling, roof or surface (refer 405.2.1(f))

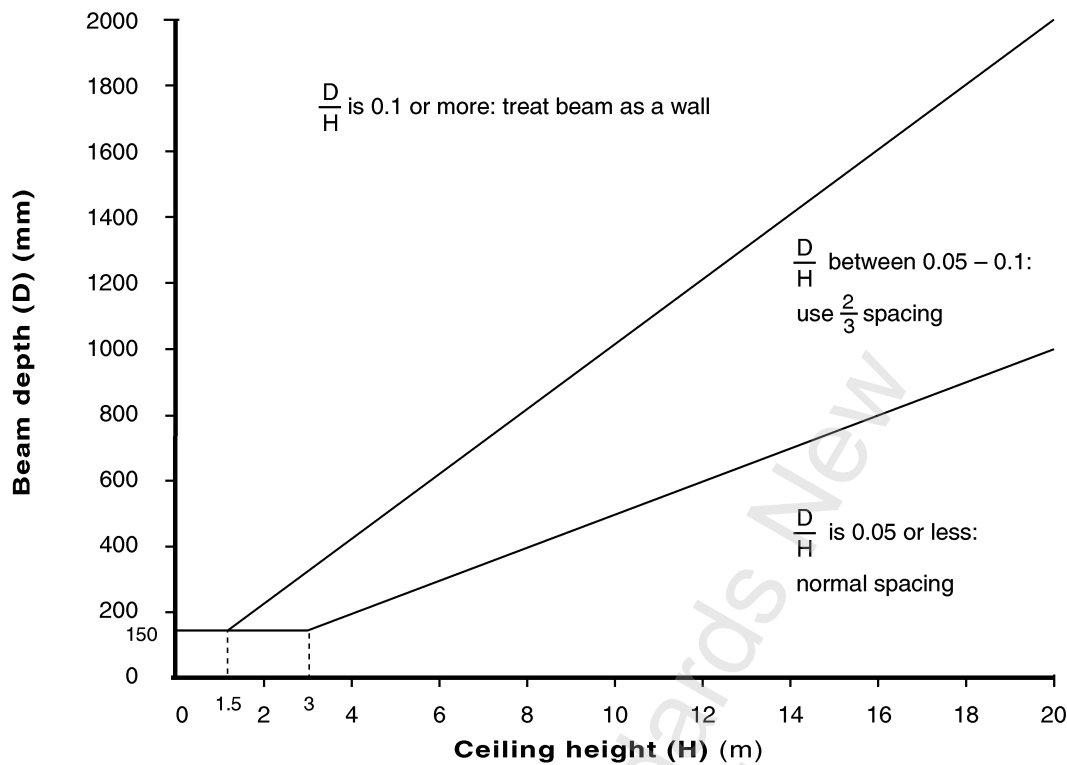


Figure 3 – Effect of beam depth and ceiling height on detector spacing (refer 405.2.1(n) (ii) and (iii))

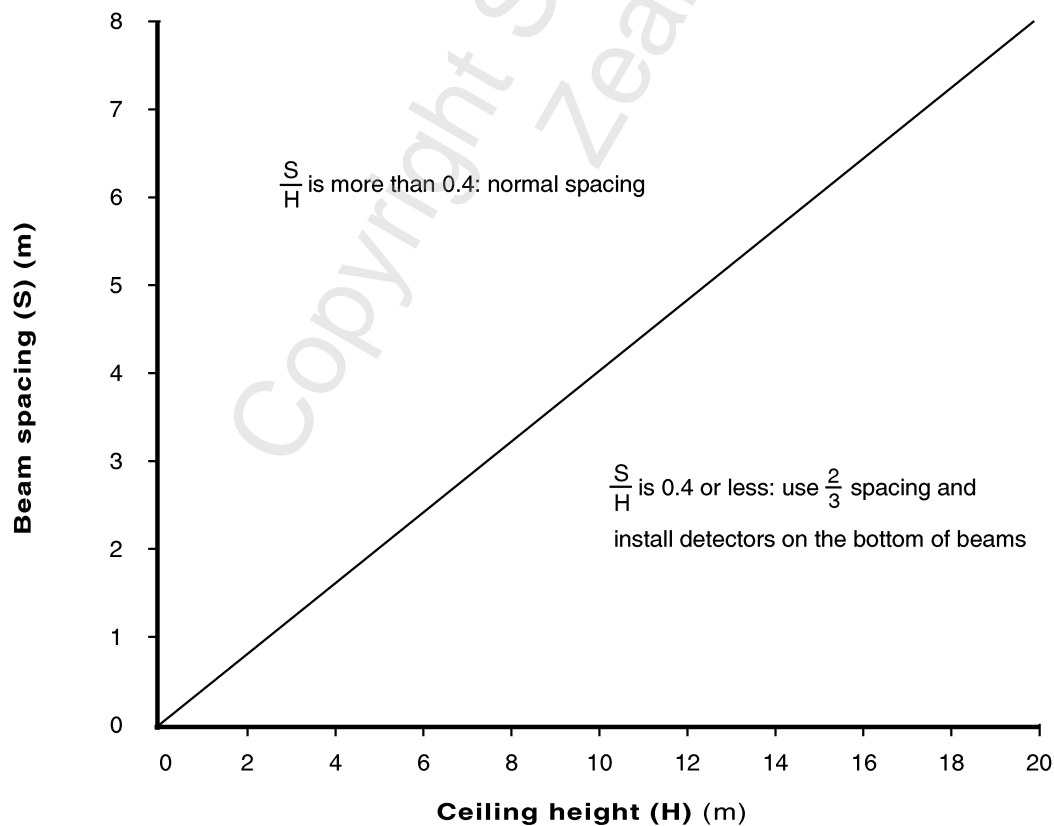


Figure 4 – Effect of beam spacing and ceiling height on detector spacing (refer 405.2.1(n) (iv))

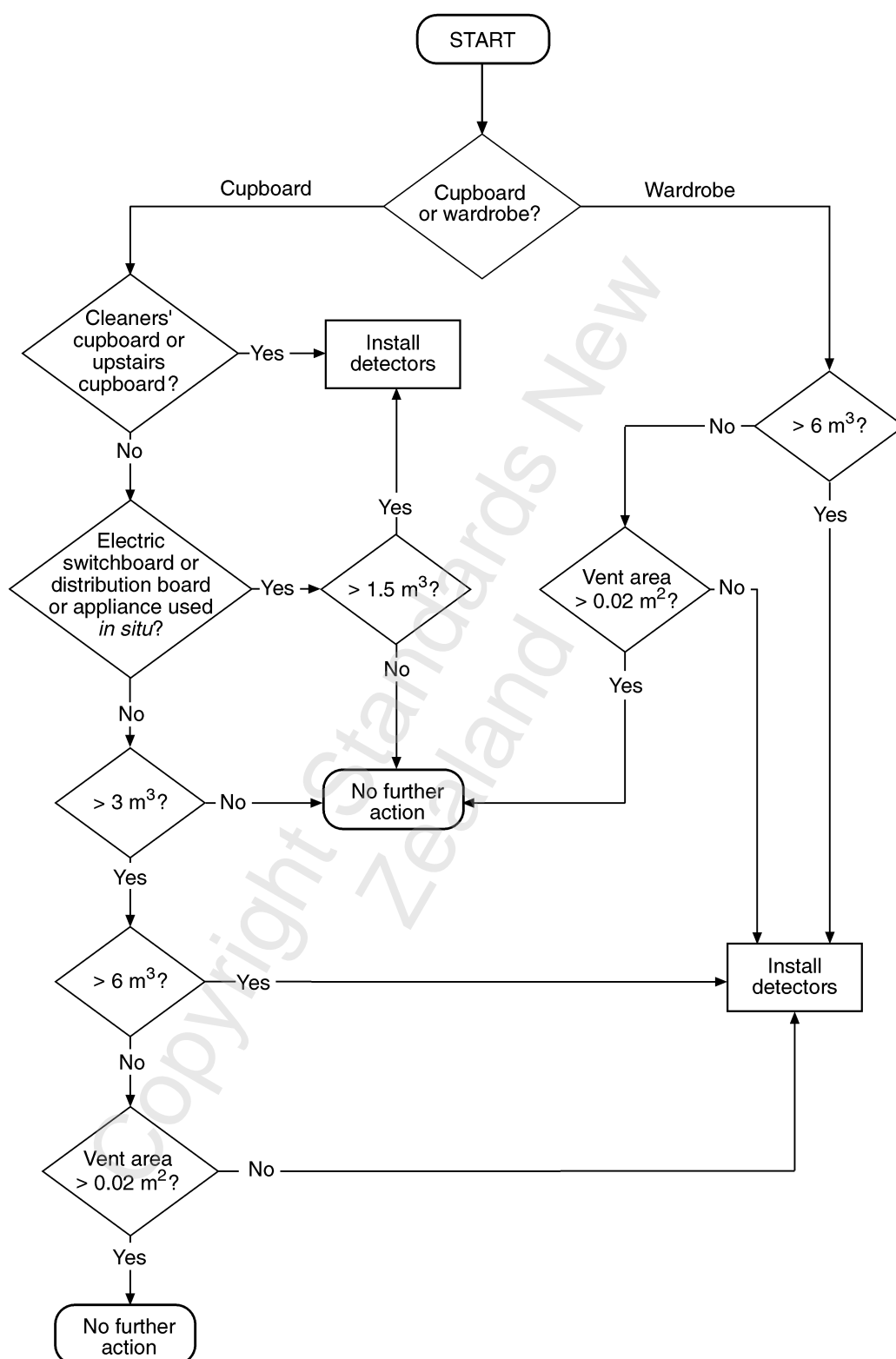


Figure 5 – Protection of wardrobes and cupboards flowchart (refer 405.2.1 (r), (s), (t) and (u))

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405.2.2

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

- (a) Concealed spaces which are fire isolated with a minimum fire resistance rating of 30/30/30 and which do not include combustible construction, materials, services or equipment;
- (b) Concealed spaces between the lowest floor and ground which do not contain equipment or stores and to which there is no access;
- (c) Concealed spaces less than 0.75 m deep between false ceilings and fire resisting slabs above, and which do not contain any combustible material;

NOTE – Flush-mounted light fittings, small air conditioning dampers, fans and associated wiring, in such concealed spaces are not regarded as “combustible” for the purposes of this Standard.

- (d) That part of concealed spaces under roofs which are neither formed of, nor contain combustible materials, and which are < 0.75 m deep.

NOTE – If roof pitch means that the width of the space which is < 0.75 m deep is > 3 m, then the first line of detectors shall coincide with the line at which the depth of the roof space is 0.75 m and the maximum area of coverage per detector shall still apply.

- (e) Individual water closets which open off a protected room and where the doors or walls or both are not full height;
- (f) Adjacent fire cells (unless required by the NZBC, or the declared functional requirement);
- (g) Where there is a false ceiling of a perforated type and the open area, consisting of individual holes each at least 625 mm² in area, exceeds 50 % of the total area, it is sufficient to locate detectors on the main ceiling above the false ceiling.

405.3 Spacing

405.3.1

Point type heat actuated 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 more than 1 in 12. The heat collector shall not project below the bottom of the beam;
- (b) Not exceeding 6 m centres in general areas and 9 m in corridors; and
- (c) Not exceeding 3 m from any wall or partition and 4.5 m in corridors; and
- (d) Not less than one detector for each 30 m² of floor area.

405.3.2

Line type heat actuated detectors shall be spaced as follows:

- (a) In accordance with the conditions of 405.2 in so far as they are applicable and appropriate;
- (b) Lines shall be so disposed throughout the building that adjacent lines are not more than 6 m apart and all walls are within 3 m of a line;
- (c) Mounted within 500 mm of the apex of each apex type roof.

405.3.3

Point type smoke actuated detectors shall be spaced as follows:

- (a) Not exceeding 10 m between detectors;
- (b) Not exceeding 5 m from any wall or partition;
- (c) Not less than one detector for each 90 m² of floor area.

405.3.4

Beam type smoke actuated 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 405.2 in so far as they are applicable and appropriate;
- (c) So disposed throughout the building that adjacent beams are not more than 14 m apart and all walls are within 7 m of a beam;
- (d) Mounted within 600 mm of the apex of each apex type roof.

405.3.5

Aspirating smoke detection sampling points for room protection shall be spaced so as to comply with 407.2 but shall not be at greater spacing than the requirements for point type smoke actuated detectors in 405.3.3.

406 ALERTING DEVICES

406.1

The audible signal produced by the alerting devices shall be easily distinguishable against the ambient noise and shall be of a character distinguishable from other signals. Except as permitted in 406.5, audible devices used throughout a system shall produce identical alerting signals.

406.2

Voice messages forming part of the audible signal shall provide clear and readily understandable instructions.

406.3

At any location within the signal reception area, the A-weighted sound pressure level of the audible alerting devices measured by a meter to BS EN 60651, with the time weighting "F" (fast) shall exceed by a minimum of 5 dB the noisiest background sound pressure level averaged over a period of 60 s except that where voice facilities are used for evacuation purposes the sound pressure shall exceed the noisiest background sound pressure level by 10 dB. The sound pressure level of the audible signals, however, shall be not less than 65 dBA and not more than 100 dBA measured at any normally accessible point in the room at a height of 1.8 m. In buildings providing accommodation the minimum sound shall be 75 dB(A) at the bedhead unless 406.5 or 406.7 applies. Sound Pressure Levels (SPL) shall be measured with all doors closed.

406.4

When the ambient noise level exceeds 90 dB(A), or where ear protectors are worn, visual alerting devices shall also be provided. The number and disposition of visual alerting devices and the intensity of the visible signal shall be such as to ensure perception by the occupants.

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406.5

Where audible 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 on a 24 h basis, a combination of low level audible and visual devices shall be provided so as to alert staff wherever they may be located;
- (b) In other areas, a combination of low level audible and visual devices to alert all occupants.

In both cases, provision may be made for a responsible person to mute the audible sounders.

406.6

A minimum of 2 alerting devices per system shall be installed.

406.7

The type of alerting devices in hospital wards or other areas where care is provided may be a combined pulsing light and low noise level sounder that is common to all such areas.

Such devices shall have:

- (a) A visual alerting device (refer section 218).
- (b) An audibility level of no less than 5 dBA above ambient noise level. If the sounder is pulsed then it shall pulse at the same rate as the pulsing light.

406.8

An EWIS system installed so as to comply with AS 2220.2 may be used as the alerting devices.

406.9

For recessed devices the label required by 218.3 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.

406.10

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 to draw attention to the location of the indicating unit.

407 MULTI-POINT ASPIRATED SMOKE DETECTORS

407.1

Multi-point aspirated smoke detectors may be used to provide conventional room protection in compliance with 405.2.1(a), where installed in accordance with 407.2 to 407.14.

Where the Declared Functional Requirement 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 aspirated smoke detection may be used if installed in accordance with 407.4, 407.5, 407.7, 407.9, 407.10 and 407.11. 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 Requirement.

407.2

The requirements of AS 1603.8, in respect to installation of multi-point aspirated smoke detectors, shall be complied with, where these do not conflict with the requirements of this Standard.

NOTE – AS 1603.8 contains installation-dependant requirements for system design, components and performance.

407.3

The total system design shall ensure that the system has a sensitivity equal to or greater than equivalent point type smoke detectors covering the same area.

407.4

The air-sampling network design shall be such that the amount of airflow drawn from the penultimate sampling point 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.

407.5

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 jeopardize the long term reliability and performance of the system.

407.6

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 m² shall have a minimum of 2 sampling points.

407.7

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

407.8

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

407.9

Aspirating network pipes shall be installed in accordance with NZECP section 28 or NZS 3000 subclause 301.26 (flexible conduit) or 301.27 (rigid non-metallic conduits) (as appropriate). All joints shall be airtight.

407.10

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.

407.11

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 1159.

407.12

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".

407.13

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.

407.14

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 false alarms.

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PART 5 COMMISSIONING

501 GENERAL

501.1

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

501.2

EWIS systems shall be commissioned in accordance with AS 2220.2.

502 VISUAL EXAMINATION

502.1

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

- (a) Wiring of the control and indicating units;
- (b) That 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 and tubing;
- (e) Location and area of coverage of detectors;
- (f) Manual call point location;
- (g) Alerting device locations;
- (h) That the log book and documentation specified in 506.1 has been supplied;
- (j) That the marking is in accordance with section 224 and 402.11;
- (k) That the zone control and indicating units have been located correctly in relation to the fire brigade attendance points;
- (m) That zones have been correctly designated;
- (n) That indicators and legends, when operated, clearly indicate their function at a viewing distance of 2 m.

503 TESTS ON ELECTRICAL EQUIPMENT

503.1

Carry out tests on all the electrical equipment as follows:

- (a) Using an insulation tester operating at not less than 250 V, measure the leakage resistance from conductors in each cable to earth. No reading shall be less than 5 MW;
- (b) Verify that the electrical wiring is in accordance with the requirements of the relevant statutory regulations;

- (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 (refer 204.6);
- (d) Where ancillary services are connected to the system, verify that the voltages do not exceed the limits specified in 203.3;
- (e) Verify that each battery complies with section 213, or section 214, as appropriate;
- (f) Verify that the output of any battery charger complies with the requirements of section 212.

504 TESTS ON PNEUMATIC EQUIPMENT

504.1

Carry out tests on all pneumatic equipment as follows:

- (a) Allow gas to escape via the full length of the circuit to verify 219.11;
- (b) Verify that the operation of a detector or manual call point in each circuit results in the operation of the fire alarm indicator within 15 s (see 219.10);
- (c) Verify that when gas is allowed to escape from the supply a defect signal arises initially (see 219.12), and degrades into fire when the quantity of gas is reduced below the level required to signal fire condition (see 219.13);
- (d) Verify that the gas leakage rate as measured between the gas storage vessel and the pneumatic system does not exceed 5 ml/min or 1 ml/min per zone, whichever is the greater, at normal working pressure.

505 TESTS TO VERIFY CORRECT OPERATION AND FUNCTION

505.1

Carry out tests to verify the correct operation and function of the system as follows:

- (a) All detectors are in circuit;
- (b) Manual call point operation, except those designed for once only operation;
- (c) Alerting devices;
- (d) Control and switching facilities;
- (e) Visual indicators, and also that the correct zone is indicated;
- (f) The removal of a detector from a circuit results in a signal being indicated;
- (g) The removal of a manual call point from a circuit results in a signal being indicated;
- (h) Defect warning facilities by simulating the appropriate defect condition in accordance with 208.1;
- (j) Where connected to a remote receiving centre, and with the complete system in the normal operational condition, the operation of a zone circuit results in a fire alarm signal being received;
- (k) With the complete system in the normal operational condition the operation of a zone circuit results in the appropriate alerting devices operating;

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- (m) 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.
- (n) Perform appropriate testing of multi-point aspirated smoke detection systems to ensure that the design objectives for sensitivity, proportion of air, and transport time have been achieved.

506 DOCUMENTS

506.1

In addition to a log book for test and survey records required per 602.9 and 603.13, adequate documentation shall be provided, and maintained with the system detailing:

- (a) All equipment installed, its location, interconnection and intended function;
- (b) Any special requirements for maintenance or replacement of system components;
- (c) Software versions and site-specific configuration data;
- (d) All subsequent additions, alterations and amendments to the system, its components and configuration.

507 CERTIFICATE OF COMPLETION

507.1

A certificate of completion shall be provided on satisfactory completion of the commissioning tests. A typical certificate is shown in Appendix C. The certification of completion shall be held with other documents (see 506).

PART 6**MAINTAINING SYSTEMS IN COMPLIANCE AND GOOD WORKING ORDER****601 GENERAL****601.1**

Fire alarm systems shall be maintained in compliance with this Standard and in good working order at all times.

601.2

Tests, inspections, other routine maintenance, and reporting specified in this Part shall be carried out at the intervals specified. Deficiencies identified by such work shall be remedied immediately.

601.3

Any defect or previously unnotified isolate warnings generated by the fire alarm system shall be immediately investigated and remedial action, as appropriate, implemented.

601.4

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.

601.5

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 have successfully completed an applicable industry training programme.

Where the actions described in 601.1 to 601.4 are performed by appropriately qualified persons, then the requirements of this part of the Standard are deemed to have been met.

602 MONTHLY CHECKS AND TESTS**602.1**

Monthly checks and tests shall be carried out as specified in this section.

602.2

Check the float voltage across any rechargeable battery to ensure that the voltage per cell is maintained within the limits listed in 212.5.

602.3

Check that (where appropriate) the specific gravity and electrolyte level of each cell of any rechargeable battery is correct. Check that the voltage of any non-rechargeable cell is above the defect warning level specified in 208.1(a).

602.4

Check that the battery cabinet and battery terminals are maintained in a clean serviceable condition.

602.5

Test to ensure correct operation of the system, including all alerting devices and indicators, by using the test facilities in zone circuits with the system in the isolate mode. The system shall be reset to normal after completion of the tests.

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 which do not operate. During this test the system may give a defect warning signal.

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602.6

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.

602.7

The battery shall be tested for 10 s at not less than the 5 h discharge rate. During this test the battery voltage shall not fall below the level set for signalling fire. The battery under test shall not receive any assistance from any other power source. (See 211.6)

602.8

Each battery shall be marked with its installation date and any battery which exceeds the service life specified by its manufacturer shall be replaced.

602.9

A test report shall be completed and the results entered in the owner's log book. The report shall be copied to the owner and to any authority or agency required to receive one.

603 ANNUAL CHECKS AND TESTS

603.1

Annual checks and tests shall be as in 602, and additionally as specified in this section.

603.2

Check that the warning facilities are operating correctly for the following conditions:

- (a) Failure or disconnection of the battery;
- (b) Failure or disconnection of the leads to a detector or manual call point;
- (c) Absence of any plug-in zone circuit board.

603.3

Test *in situ* the operation of all manual call points.

Automatic fire detectors shall be tested according to the following:

- (a) Heat detectors shall be sample tested *in situ* by applying a safe heat source to a minimum of 2 % of 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 and/or identify other potentially defective detectors. Appropriate remedial action shall be carried out to all affected detectors. Any detectors destroyed during these tests (e.g. eutectic alloy type) shall be replaced using types of current manufacture and compatible with the system type.
- (b) Smoke detectors shall be sample tested by checking the sensitivity of a minimum of 20 % of the detectors. These detectors shall then be cleaned and given an *in situ* test by applying test smoke, or other phenomena which directly simulate the fire products being detected. If any detector fails to operate, or if the calibration of any detector falls outside the manufacturer's recommended limits, a further sample of 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 and/or identify other potentially defective detectors. Appropriate remedial action shall be carried out on all affected detectors.

Where a smoke detector is able to signal a maintenance request when its calibration 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.

The sensitivity of all aspirated smoke detectors shall be tested. 20 % of sampling points shall be given an *in situ* test as above.

- (c) Other detector types shall be tested by means appropriate to that detector type.
- (d) 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.
- (e) A minimum of 1 detector per zone shall be tested.

The *in situ* test shall be of a simple "go/no go" nature and shall check that both the device and zone control panel operate correctly.

603.4

Check the operation of each zone circuit from either the end of line element or the most remote detector or manual call point, to the output of the zone control unit signalling device.

603.5

Make a thorough visual examination of the general condition of all components of the system.

603.6

Clean all aspirated system pipe work using alternating vacuum/positive pressure to remove internal dust build-up. Clean or replace all aspirated smoke detector filters.

NOTE – In dirty environments this may need to be performed more often.

603.7

Check the entire premises 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.

603.8

Check that indicators and legends are still current and that they clearly indicate their function at a viewing distance of 2 m.

603.9

Check the correct operation and function of the defect warning facilities by simulating the appropriate condition in accordance with 208.1.

603.10

Check the interface between the fire alarm system and any ancillary service forming part of the building's fire safety system (e.g. smoke control system, lift override etc.).

603.11

Using an insulation tester operating at not less than 250 V, test the insulation resistance of cables as follows:

- (a) Where electronic devices are not connected, measurements are to be made between conductors and from each conductor to earth.
- (b) For all other wiring, measurements are to be made from each conductor to earth.

Measured values shall not be less than 0.5 MΩ.

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603.12

Check that a fire alarm is initiated within 90 s of the introduction of suitable test smoke or gas into the penultimate hole of each branch of an aspirated sampling network.

603.13

A test report shall be completed which records the results of all tests and inspections together with a list of non-complying features and corrective measures necessary to return the system to compliance with this Standard. 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.

604 PNEUMATIC SYSTEMS: ADDITIONAL REQUIREMENTS

604.1

Where applicable checks and tests as specified in sections 601 to 603 inclusive shall be carried out for pneumatic systems. In addition the checks and tests specified in this section are required.

604.2

Annual tests shall be made on each zone circuit to ensure that a fire alarm is initiated within 60 s when gas is allowed to escape via the full length of the circuit while the remainder of the system is in the normal working condition (i.e., with all restricted feeds connected).

604.3

Annual tests shall be made to verify that the leakage rate specified in 504.1(d) is not exceeded.

605 EWIS SYSTEMS: ADDITIONAL REQUIREMENTS

605.1

The checks and tests as specified in sections 601 to 603 inclusive shall be carried out for EWIS systems where applicable and in addition the checks and tests specified in AS 1851.10 shall be undertaken.

PART 7

PRECAUTIONS TO BE TAKEN WHEN A FIRE ALARM IS RENDERED INOPERATIVE

701 General

Fire alarms may be rendered inoperative from time to time to effect maintenance, repairs or alterations. The contractor shall follow the procedures and the owner shall take the precautions specified in this part of the Standard.

702 Notification

702.1

Before the alarm system is rendered inoperative oral notification of the extent and effect of the impairment shall be given to the authorized representative of the owner or occupier or person in charge of the building. If an emergency compels immediate action to render the system inoperative, such notification shall be given as soon as possible thereafter.

702.2

Oral notification shall be confirmed promptly in writing.

702.3

Notification to the owner shall be given on a notification form a sample of which is provided in Appendix D. This form also gives precautions which the owner should take during the period the alarm system is inoperative.

703 Permanent disconnection

The contractor shall notify the Fire Service and territorial authority in writing when an alarm system is rendered permanently inoperative.

704 Authorization

Except in emergency, the system shall not be rendered inoperative until the owner or his representative has authorized the work by signing the notification form in Appendix D.

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APPENDIX A

(Normative)

SIGNALLING TO A REMOTE RECEIVING CENTRE

A1 DEFINITIONS

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

SIGNAL TRANSPORT SYSTEM. An alarm communications system offering a communication link between 2 points without necessarily having a dedicated signal path between the 2 points.

CO-LOCATED. Two pieces of equipment are co-located when separated by a distance of no more than 5 m and have common access.

SECTOR. An area containing one or more zones and able to be covered by one zone control unit. A sector shall be confined to a single building, except that separate small buildings each covered by not more than one zone readily accessible from the fire brigade attendance point of the zone control unit, and not more than 50 m from the main building, may be covered by that control unit (see figure A1).

SECTOR CONTROL UNIT. A cabinet containing equipment for controlling 2 or more sectors and normally incorporating an externally visible display.

A2

The need for signal transmission ("connection") to a remote receiving centre should be determined by reference to the declared functional requirements of the system pursuant to section 104, and connection will be required as follows:

Declared functional requirement	Acceptable type of remote receiving centre	
	NZ Fire Service	Other
(a) To transmit an alarm to summon NZ Fire Service assistance – as per 104.1(a)	Yes	No
(b) To transmit an alarm to summon some other specified emergency fire related assistance – as per 104.1(f)	No	Yes
(c) To monitor and signal to a remote location the presence of faults – as per 104.1(b), where: 104.1(a) applies – as in (a) above 104.1(f) applies – as in (b) above but NOT (a)	Yes No	No Yes

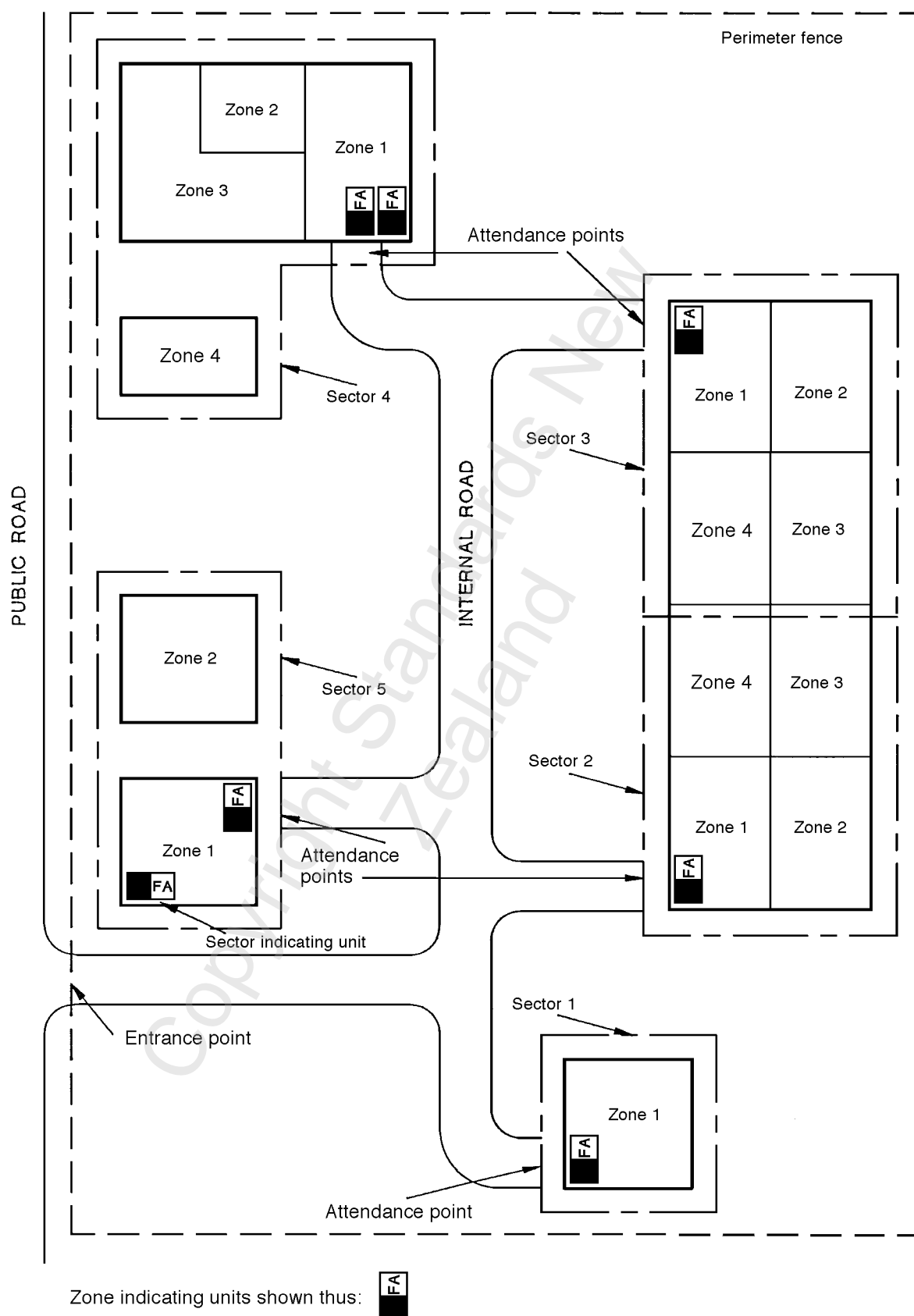


Figure A1 – Example layout of zones and sectors

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A3

Signalling to a remote receiving centre shall be achieved by:

- (a) A dedicated signal path from each zone control unit; or
- (b) A signal path common to more than one zone control unit; or
- (c) An alarm transport system.

NOTE – In all cases the characteristics of the receiving equipment must be established.

A4

A4.1

Each zone control unit shall be connected to a co-located or integral transmitting device which shall communicate continuously with the remote receiving equipment or sector control unit. Where all zone control units are connected directly to remote receiving equipment, a sector control unit is not required.

A4.2

The ability of the transmitting device to transmit a signal shall not be dependent on the energy supply from the fire alarm control unit.

A4.3

Where the transmitting device cannot be powered from the remote receiving equipment or the sector control unit, a separate supply shall be provided integrated with the transmitting device and with the capacity to ensure that the fire alarm signal can be transmitted on complete failure of the electrical supply to the fire alarm control unit in compliance with 211.6.

A4.4

The separate supply shall be supervised to give a defect warning as required by this Standard and shall have sufficient capacity to signal fire in event of the main system battery failure.

A4.5

Failure of the communications link between the transmitting device and the remote receiving centre or sector control unit shall not result in a fire signal at the receiving centre or sector control unit.

A4.6

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. Failure of the communications link between the transmitting device and sector control unit shall result in a defect signal at the sector control unit.

A5

In the case of a common signal path (see A3(b)) the subsequent clauses of this Appendix shall apply.

A6

The design of sector control units shall meet the design requirements of Part 2 excepting sections 202, 205, 207, 216, 217 and 218. Sector control units shall also include the following facilities:

- (a) Externally visible indicators of fire alarm and defect warning for individual sectors;
- (b) A monitored energy supply having a sufficient capacity to supply the normal load of the sector control unit for 24 h and then the maximum alarm load for 4 h;

- (c) A short or break in the circuit between a sector control unit and a zone control unit, or an isolate signal from a zone control unit, shall generate a defect warning signal;
- (d) A fire alarm signal received by the sector control unit shall override any defect warning signal received by the sector control unit;
- (e) Signals to the remote receiving centre shall not be latching within the sector control unit;
- (f) A single short circuit or break in the communication link between a transmitting device and the sector control unit, shall result in loss of signalling from the transmitting devices in no more than one sector.

NOTE – One sector may contain more than one transmitting device (e.g. automatic fire alarm and fire sprinkler system covering the same area).

A7

Where zone control units are co-located with the sector control unit the requirements of A6(c) need not apply but the following shall be required:

- (a) A break in the circuit shall generate either a defect warning or a fire alarm signal;
- (b) The circuit wiring shall be to NZS 6401 except that conductors may be solid or stranded.

A8 SECTOR INDICATING UNIT

A8.1

The location of the individual zone control units relative to the usual viewing position of the sector control unit shall be clearly defined on the sector indicating unit.

A8.2

Where both sector and zone indicators are provided on one unit clear differentiation shall be made between the 2 functions.

A8.3

The sector indicating unit need provide fire indication only.

A8.4

No sector indicating unit is required if all zone indicating units are co-located.

A8.5

The sector indicating unit shall be located near the main entrance point so that, in order to reach a zone control unit, the fire appliance is not required to return along roads already traversed.

A8.6

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.

A9 POWER SUPPLIES

A9.1

The power supply for sector control and indicating units shall meet the requirements of sections 211, 212 and 213 and also of 403.3.

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A9.2

The sector control and indicating unit may share a power supply with repeating sector indicating units but shall not share a power supply with any zone control equipment.

A10 INSTALLATION

A10.1

The installation of sector control and indicating units shall meet the requirements of Part 4, Installation, excepting 402.1, 402.2(a), (g) and (m), and 402.7.

A10.2

Earth return input circuits are not acceptable. Conduit or other metal sheathing of conductors shall not be used as any part of the input circuits.

A10.3

All zones shall be included in the designation of sectors.

A10.4

Zone circuits shall not terminate at sector control units.

A10.5

The output from the zone control units shall go only to the sector control unit.

A10.6

A sector control unit shall not be connected to an input of another sector control unit.

A11 COMMISSIONING

A11.1

The commissioning of sector control and indicating units shall meet the requirements of Part 5 excepting 503.1(a).

A11.2

Checks shall also be made that sector control and indicating units have been located correctly in relation to the fire brigade attendance points and that sectors have been correctly designated.

A12 REGULAR INSPECTION AND TESTING

A12.1

The inspection and testing of sector control and indicating units shall meet the requirements of Part 6 excepting 602.5, 603.2(b), 603.3, 603.4, 603.6, 603.11 and 603.12.

A12.2

Test to ensure the correct operation of the sector control and indicating units, including indicators, by using the test facilities in input circuits with the system in the isolate mode.

APPENDIX B

(Normative)

SPECIFICATION FOR MANUAL CALL POINTS

B1

Manual call points shall be of a strong, rigid construction. The method of operation shall be the breaking of a frangible element followed by the manual operation of a switch.

B2

The method of operation shall be clearly indicated by a concise inscription, displayed on or adjacent to each manual call point as shown in figure B1.



Minimum dimensions 115 mm by 100 mm

NOTE –

- (1) Method of operation and telephone no. of fire brigade or other site emergency number to be inserted in the appropriate boxes.
- (2) Colour of shaded area to be No. 537 of NZS 7702 or 04 E 53 of NZS/BS 5252. Boxes and frame black.

Figure B1 – Notice to be displayed on, or adjacent to, each manual call point

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B3

The construction shall provide safeguards against accidental operation and shall also provide positive indication that the device has been operated. The breaking of a frangible cover shall not of itself operate the alarm.

B4

Connection arrangements shall be such that it is not possible to remove a manual call point from the service without initiating a defect warning or fire alarm signal.

B5

The frangible element shall have an exposed area of not less than 5500 mm². The maximum dimension shall not be greater than 1.5 times the minimum dimension. Such frangible material shall comply with the test requirements of BS 5839:Part 2, Appendix A.

B6

Manual call points exposed to the weather shall have a degree of protection to IP24 of AS 1939.

B7

Colour finish of the outside shall comply with shade No. 537 of NZS 7702 or colour 04 E 53 of NZS/BS 5252 on at least 50 % of the exposed surface.

B8

Where a manual call point utilizes a mechanical contact to initiate a fire alarm that contact must be closed in its normal condition, opening to initiate the fire alarm.

B9

Where the occupancy of the premises can result in repetitive malicious false alarms of fire, a hinged cover, with or without a non-latching audible device to identify that the cover has been opened, may be incorporated in the manual call point provided, in addition to complying with B2, that:

- (a) The cover is labelled "COVER ONLY", and;
- (b) The cover does not impair easy activation of the manual call point.

APPENDIX C

(Informative)

CERTIFICATE OF COMPLIANCE FOR FIRE ALARM SYSTEM

Front side

CERTIFICATE OF COMPLIANCE FOR FIRE ALARM SYSTEM

Certificate No.

1. Building
2. Location
3. Nearest fire station
4. Name/Address of owner
.....
5. Name/Address of installation agent
.....
6. Details of system: automatic/self-monitored manual/non-monitored manual
 - (a) The declared functional requirements
 - (b) Equipment manufacturer
 - (c) Equipment appraisal certificate No
 - (d) General description – Occupancy
 - (e) Detail of any remote connection
7. Details of ancillary services connected to the system
.....
8. Date of completion
9. Commissioning details on reverse this sheet completed YES / NO
10. Index plan attached YES / NO
11. System documentation provided YES / NO

I hereby certify that the above system has been inspected and tested in accordance with NZS 4512 and on the basis of the results this system complies with the Standard.

Installer:

Inspector:

Signed

Signed

Capacity of signatory

Capacity of signatory

Date

Date

Company

Company

Address

Address

.....

.....

.....

.....

.....

.....

APPENDIX C (reverse side)

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NOTE – Includes alerting device circuits.

APPENDIX D

(Normative)

NOTIFICATION FORM – FIRE ALARM ISOLATION

PART A: SYSTEMS (Contractor to fill in)

1. Name of Protected Premises
2. Address
3. Name of Contractor

PART B: DETAILS (Contractor to fill in)

It is proposed to render the Alarm system in the above premises inoperative as follows: (Zones isolated should be kept to a minimum)

1. Dates and estimated times off
2. Parts of premises affected
3. Reason
4. Details of alterations
5. Details of auxiliary systems affected

Company Representative Sign

Date Time

NOTE: Owner/Occupier must be notified when system is reinstated.

PART C: OWNER/OCCUPIER

I have noted the above and authorize the above work to be carried out.

Signed Date Time

Name Position

In addition I have taken the precautions listed below:

- (a) Where sprinklers are installed ensure they are operative ☐
- (b) Ensure all Smoke Stop Doors are closed ☐
- (c) Advise Fire Wardens system is inoperative.
(Procedure to notify other staff should be pre-established) ☐
- (d) Ensure a person (Receptionist) is detailed to ring the NZ Fire Service in an emergency ☐
- (e) Ensure Alarm Company can re-established evacuation sounders if required ☐
- (f) Where other systems (lifts, air conditioning, etc.) are affected by the Alarm shutdown
manual controls need to be checked ☐
- (g) Fire precautions such as stopping welding and hot work should be taken during the
period the Alarm is down ☐
- (h) Arrange to notify others who may use the building during the period of isolation ☐

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Other Standards for Fire Protection

New Zealand Standards

NZMP 9:1989	Fire properties of building materials and elements of structure
NZS 2139:1967	Specification for heat actuated fire detectors
NZS 4232:1988	Performance criteria for fire resisting enclosures (superseded in part by AS/NZS 1905:Part 1)
NZS 4501:1972	Code of practice for location marking of fire hydrants
NZS 4503:1993	Code of practice for the distribution, installation and maintenance of hand operated fire fighting equipment for use in buildings
NZS 4504:1981	Specification for fire hose reels
NZS 4505:1977	Specification for fire-fighting waterway equipment
NZS 4511:1979	Specification for bucket pump fire extinguishers
NZS 4514:1989	The installation of smoke alarms
NZS 4515:1995	Fire sprinkler systems for residential occupancies (including private dwellings)
NZS 4541:1996	Automatic fire sprinkler systems

Joint Australian/New Zealand Standards

AS/NZS 1841:- - -	Portable fire extinguishers
Part 1:1997	General requirements
Part 2:1997	Specific requirements for water type extinguishers
Part 3:1997	Specific requirements for wet-chemical type extinguishers
Part 4:1997	Specific requirements for foam type extinguishers
Part 5:1997	Specific requirements for powder type extinguishers
Part 6:1997	Specific requirements for carbon dioxide type extinguishers
Part 7:1997	Specific requirements for vaporizing-liquid type extinguishers
Part 8:1997	Non-rechargeable type
AS/NZS 1850: 1997	Portable fire extinguishers – Classification, rating and performance testing
AS/NZS 1851:- - -	Maintenance of fire protection equipment
Part 13:1995	Wheeled fire extinguishers
AS/NZS 1905:- - -	Components for the protection of openings in fire-resistant walls
Part 1:1997	Fire-resistant doorsets
AS/NZS 3504:1995	Fire blankets
AS/NZS 4353:1995	Portable fire extinguishers – Aerosol type

FIRE ALARM SYSTEMS IN BUILDINGS

AMENDMENT No. 1

February 1998

CORRECTION

Figure 5 - Protection of wardrobes and cupboards flowchart (page 41)

In the top left hand flow path decision shape, **delete** "upstairs" and **substitute** "understairs".

(Amendment No. 1, February 1998)

503.1 (page 46)

In item (a) at the end of the second line, **delete** "MW" and **substitute** "MΩ".

(Amendment No. 1, February 1998)

APPENDIX C (page 61)

In the Appendix title, **delete** "COMPLIANCE" and **substitute** "COMPLETION".

In the certificate title, **delete** "COMPLIANCE" and **substitute** "COMPLETION".

In item 6, first line, **delete** "automatic/self-monitored manual/non-monitored manual" and **substitute** "automatic/manual/single zone/multizone".

(Amendment No. 1, February 1998)

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FIRE ALARM SYSTEMS IN BUILDINGS

AMENDMENT No. 2

October 1999

REVISED TEXT

EXPLANATORY NOTE

Amendment No.2 modifies a number of existing provisions. It clarifies the requirements for zone index diagrams; provides more specific provisions for zonal and staged evacuation; specifies the FRR for transmission cable; standardizes audible alerting device sounds; revises detector spacings in the presence of beams and joists; makes provision for local smoke detection alarms in certain situations; and, modifies testing and maintenance requirements for alerting devices.

In the preparation of this amendment, the committee has been mindful of the (often conflicting) needs to simultaneously improve system sensitivity whilst minimizing the incidence of false and unwanted alarms.

To allow time for the development and approval of new equipment and contracts, the changed or new provisions and requirements of the following clauses will not become effective until twelve months from the date of publication of this amendment:

218.6, 402.2(o), 402.8, 406.1

APPROVAL

Amendment No. 2 was approved on 6 October 1999 by the Standards Council to be an amendment to NZS 4512:1997.

RELATED DOCUMENTS (page 4)

Add the following:

NEW ZEALAND STANDARDS

"NZS 4515: 1995 Fire sprinkler systems for residential occupancies
NZS 4541: 1996 Automatic fire sprinkler systems"

AUSTRALIAN STANDARDS

"AS 1603.2: 1997 Point type smoke detectors
AS 1603.7: 1996 Optical beam smoke detectors
AS/NZS 3013: 1995 Electrical installations – Classification of the fire and mechanical performance of wiring systems"

(Amendment No. 2, October 1999)

103 DEFINITIONS**103.1 (page 7)****APPRAISAL CERTIFICATE.**

In line 1 **delete** "which confirms" and **substitute** "containing a detailed and reasoned technical opinion".

AUDIBLE ALARM.

Delete definition and **substitute**:

"A sound signal indicating an alarm condition."

ZONE.

Delete definition and **substitute**:

"An area uniquely defined by the equipment to assist fire-fighters in searching for a fire and controlling evacuation."

(Amendment No. 2, October 1999)

104 DECLARED FUNCTIONAL REQUIREMENTS**104.1 (e) (page 10)**

Delete "specified by the owner".

104.1 (g) (page 10)

Delete and **substitute**:

"To detect heat, smoke, pre-combustion aerosols or other fire related phenomena. Such phenomena must be characteristic of a fire and must use appropriate design criteria to minimize the occurrence of unwanted alarms."

(Amendment No. 2, October 1999)

PART 2**DESIGN AND CONSTRUCTION – MULTI ZONE FIRE ALARM SYSTEMS****202 ZONES****202.1 (page 12)**

Add at the end of the clause "All alerting devices in one zone shall operate together except as permitted in 406.11."

(Amendment No. 2, October 1999)

204 FIRE ALARM**204.1 (d) (page 13)**

In line 1 **delete** "requirement" and **substitute** "requirements".

Add to the end of the sentence ", and smoke detectors installed for local alarm, in compliance with 406.11."

204.8 (page 13)

In the first line **delete** "may" and **substitute** "shall".

(Amendment No. 2, October 1999)

205 SILENCING SWITCHES**205.4** (page 14)

In line 1 **delete** "only".

(Amendment No. 2, October 1999)

210 INDICATORS**210.5** (page 16)

Add to the second to last paragraph "Indicators associated with fire-fighters' emergency services controls (e.g. air handling) may be coloured according to their function, provided they are clearly separated and distinctive from all other indicators."

(Amendment No. 2, October 1999)

216 DETECTION SYSTEM**216.2** (page 20)

In line 2 after "comply with" **insert** "Part 2 or Part 7 of AS 1603,".

(Amendment No. 2, October 1999)

218 ALERTING DEVICES**218.6** (page 22)

Delete the clause and **substitute** the following:

"Audible alerting devices:

- (a) Shall produce a standardized sound complying with AS 2220.1, 2.5.3.1 (b) or (c);
- (b) May incorporate loud speaking voice facilities in order to provide opportunity for, or better means of, evacuation control and testing;
- (c) Where they are able to provide an alert signal, may produce a pulsed version of the sound of (a) above. Alternatively the alert signal of AS 2220.1, 2.5.3.1(a) may be used, except that the requirement for escalating amplitude at start up need not apply.

Where an EWIS system is used to provide the alerting devices, the equipment shall comply with AS 2220.1 provided that the d.c. power supply system and battery capacities also comply with this standard (see sections 211 to 214). The Evacuation and Brigade Silence Alarms switches (207.1 and 205.4) shall control the EWIS system."

218.8 (a) (page 22)

Add "and shall conform to AS 2220.1, 2.5.3.1(b) or (c)."

218.8 (h) (page 22)

Add a new clause:

"The fire alarm signal shall not be used for any other purposes."

(Amendment No. 2, October 1999)

219 PNEUMATIC SYSTEMS**219.9****Add** a note:

“NOTE – Caution. The normal working pressure of systems is usually much less than 300 kPa.”

(Amendment No. 2, October 1999)

**PART 4
INSTALLATION****402 INSTALLATION PRACTICE****402.2 (o) (page 31)****Delete** item (o) and **substitute** the following:

“The cabling of transmission circuits from a zone control unit to the telecommunications demarcation point for a fire alarm system connected to a remote receiving centre shall be run in a fire rated cable. The cable shall have a 15 minute 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 a minimum fire resistance rating of 15 minutes (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.”

402.7.2 (a) (page 32)**Delete** item (a) and **substitute** the following:

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

402.7.2 (b) (page 32)**Delete** item (b) and **substitute** the following:

“The main fire brigade access into the premises and other ingress points, by means of arrows.”

402.7.2 (page 32)In the last line **insert** “Compliance with the diagram.....” at the beginning of the sentence.**402.7.3 (a) (page 32)****Delete** item (a) and **substitute** the following:

“In a single building containing only one zone and in multi-storeyed buildings where the floor plan contains only one zone per floor, and the floor plan throughout the building is similar; and”.

402.8In line 1 **delete** “visible” and **substitute** “readable”.

(Amendment No. 2, October 1999)

404 MANUAL CALL POINT LOCATIONS**404.3 (page 35)****Add** at the end of the sentence “or apartment occupants”.

(Amendment No. 2, October 1999)

405 DETECTOR SELECTION, LOCATION, POSITION, SPACING AND COVERAGE

405.2 Location and position

405.2.1 (h) (page 36)

Delete item (h) and **substitute** the following:

"Under loading dock canopies and over occupiable covered balconies, provided in each case there is no dimension less than 1.5 m. Under other external appendages where combustible material is stored or a vehicle can be parked and where there is no dimension less than 1.5 m."

405.2.1 (j) (page 36)

Add a note:

"NOTE – A roof or ceiling with a slope of less than 1 in 12 may be deemed to be flat."

405.2.1 (n) (page 36)

Delete all of item (n) and **substitute** the following:

"Where solid open joists or beams are surmounted by roofs, floors or ceilings, detectors shall be placed on or between the joists or beams in sufficient quantities to meet the following requirements (see also figure 3):

- (i) Where the beam or joist depth is less than 150 mm detectors may be mounted on the ceiling or the joists and the spacing requirements of 405.3.1, 405.3.2 and 405.3.3 shall apply.
- (ii) Where beams or joists of depth 150 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 joists, and spacing of detectors in the direction perpendicular to the joists shall be two-thirds of that required by 405.3.1, 405.3.2 and 405.3.3.
- (iii) Where the beam depth is greater than 460 mm and beams are spaced at intervals exceeding 2400 mm centre-to-centre or centre-to-wall, each beam shall be treated as a wall and the spacing requirements of 405.3.1, 405.3.2 and 405.3.3 shall apply.
- (iv) Where the beam depth is greater than 150 mm, and beams are spaced at centre-to-centre or centre-to-wall intervals of 900 mm or more, and the ceiling height (H) is less than 5 times the beam depth (D), each beam shall be treated as a wall and the spacing requirements of 405.3.1, 405.3.2 and 405.3.3 shall apply.
- (v) Where the beam depth is less than 300 mm, and beams are spaced at centre-to-centre or centre-to-wall intervals of 2400 mm or less, spacing of detectors in the direction perpendicular to the beams shall be two-thirds of that required by 405.3.1, 405.3.2 and 405.3.3. Detectors shall be mounted on the bottom of the beams if the ceiling height (H) is greater than 10 times the beam depth (D), or the ceiling height (H) is greater than 2.5 times the beam spacing (S), otherwise detectors shall be mounted on the ceiling.
- (vi) In all other cases, detectors shall be mounted on the ceiling and the spacing of the detectors from the beams shall be two-thirds of that required by 405.3.1, 405.3.2 and 405.3.3.
- (vii) Where the pattern of beams or joists is with beams and/or joists at angles to each other (i.e. cross-hatched), the two-thirds spacing requirements of items (ii) (iv), (v) and (vi) above shall be applied in both directions.
- (viii) In concealed spaces the requirements of items (i) – (vii) above shall apply except for concealed spaces less than 2 m high where the two-thirds spacing requirements of items (ii), (v), (vi) and (vii) may be ignored.



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

405.2.2 (c) (page 42)

In line 1 **delete** “0.75 m” and **substitute** “0.8 m”.

405.2.2 (d) (page 42)

In line 2 **delete** “< 0.75 m” and **substitute** “< 0.8 m”. In the first line of the Note, **delete** “< 0.75 m” and **substitute** “< 0.8 m”. In the second line of the Note, **delete** “0.75 m” and **substitute** “0.8 m”.

----- (Amendment No. 2, October 1999)

Figure 3 (page 40)

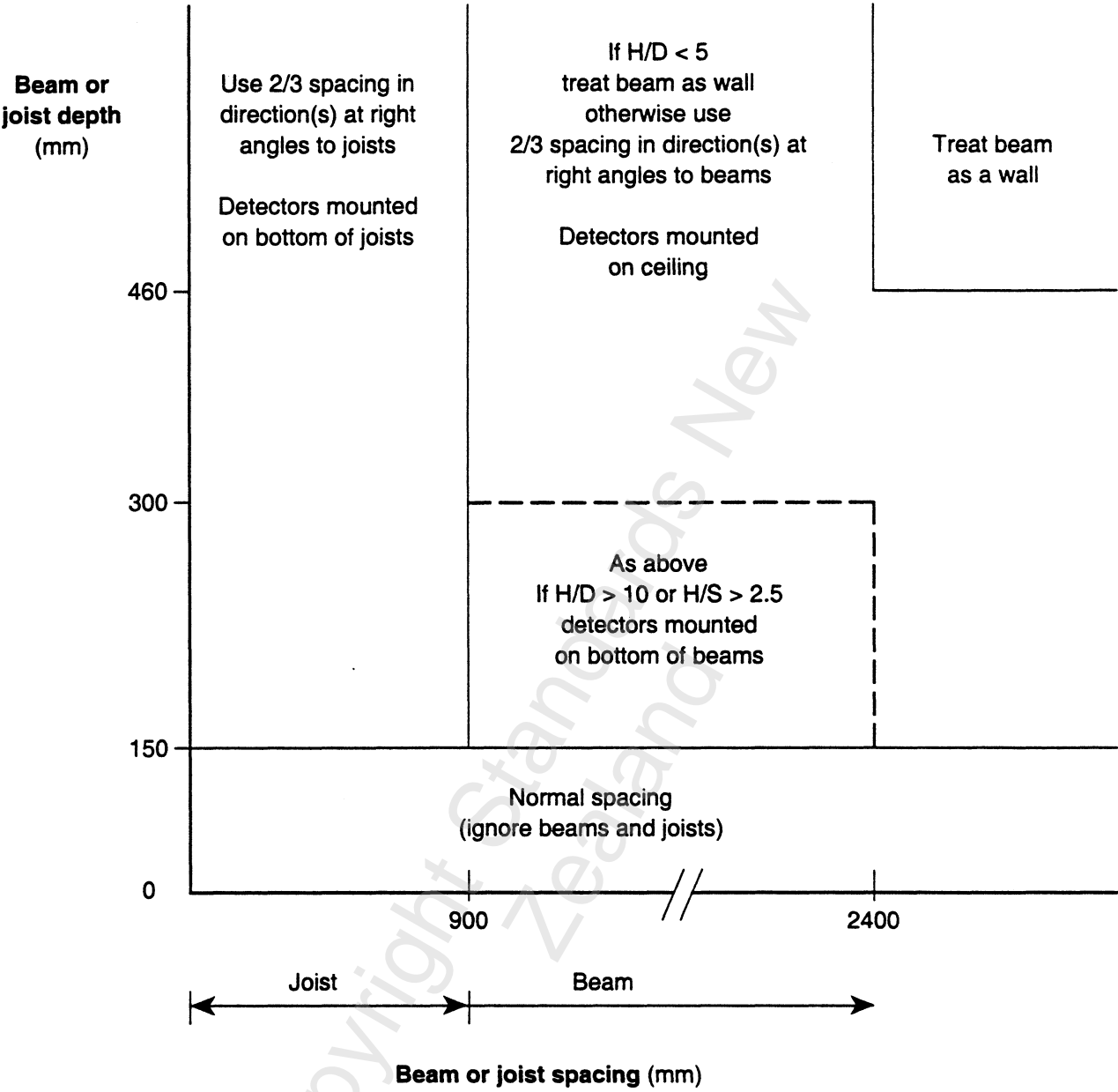
Delete the figure and **substitute** the new figure 3 (see next page).

----- (Amendment No. 2, October 1999)

Figure 4 (page 40)

Delete the figure.

----- (Amendment No. 2, October 1999)



where

- D is the beam (or joist) depth
- H is the ceiling height
- S is the beam (or joist) spacing

Figure 3 – Effect of beam depth, spacing and ceiling height on detector spacing

(Amendment No. 2, October 1999)

406 ALERTING DEVICES**406.1 (page 43)****Delete the clause and substitute:**

"Audible alerting devices used throughout a fire alarm system shall produce a signal that conforms to AS 2220.1, 2.5.3.1 (b) or (c) except as permitted in 406.5, 406.7 and 406.11 or where audible devices are added as part of an extension to an existing system. Notwithstanding, the audible devices must produce identical alerting signals throughout the building. The additional devices installed may produce the existing sound type or alternatively, all alerting devices may be upgraded to produce the AS 2220.1 signal specified above."

406.4 (page 43)**Delete the clause and substitute:**

"Where visual alerting devices are used the intensity of the visible signal shall be such as to ensure perception by the occupants. When the ambient noise level exceeds 90 dB(A), or where ear protectors are worn, visual alerting devices shall also be provided."

406.5 (page 44)**Delete item (a) and substitute:**

"In care or detention facilities in which there are on-duty staff available on a 24 h basis, a combination of low level audible and visual devices shall be provided so as to alert all such staff wherever they may be located and whatever normal duties they may be undertaking."

Delete the last sentence of the clause and substitute:

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

406.7 (page 44)**Add a new line at the end of the clause:**

"The sound character of such devices is not required to comply with 406.1."

Add a new clause (page 44):**"406.11**

In non-detained sleeping accommodation, where an apartment, hotel room or suite is fully protected with a fire sprinkler system complying with either NZS 4541 or NZS 4515, or a heat detector system complying with this standard, that generates either a total or staged evacuation of the building, it shall be acceptable for smoke detectors installed in the apartment, hotel room or suite to generate a local non-latching alarm signal within the room of origin only. Where a management response is available, a local signal shall be communicated to the management (see 104.1(f)).

The character of the local alarm sound is not required to comply with 406.1, but the installation, operation and maintenance of the smoke detector and the local alarm shall in all other respects comply with the requirements of this standard (in particular refer to 216.2)."

Add a new clause (page 44):**"406.12**

Where staged evacuation is approved by the appropriate authority, it shall be permissible to signal the evacuation alarm of 406.1 in the zone(s) or fire cell(s) from which the alarm has originated, and to sound the audible alert signal of 218.6(c) in all other zones or fire cells."

(Amendment No. 2, October 1999)

Add a new clause (page 48):

"505.2

Perform sample testing of detectors as per 603.3. Particular care should be taken to select a truly representative sample.

NOTE – Smoke detector sensitivity testing is vital for detecting initial contamination due to construction work."

(Amendment No. 2, October 1999)

PART 6

MAINTAINING SYSTEMS IN COMPLIANCE AND GOOD WORKING ORDER

602 MONTHLY CHECKS AND TESTS

602.1 (page 49)

Add at the end of the sentence "by an appropriately qualified person as defined in 601.5."

602.5 (page 49)

Delete the clause (NOTE remains) and **substitute:**

"Test to ensure correct operation of the system, including all indicators, 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. Test the alerting devices to ascertain they operate satisfactorily, as witnessed from the control panel."

(Amendment No. 2, October 1999)

603 ANNUAL CHECKS AND TESTS

Add a new clause and NOTE (page 52):

"603.14

Test and inspect to ensure correct operation of all alerting devices and that the building is adequately covered as defined in 406.3. Include all necessary measurements, adjustments and repairs to ensure the correct functioning of all alerting devices. Record all tests and results.

NOTE – The annual test and inspection described may be combined with any mandatory trial evacuation tests (e.g. as required by the Fire Safety and Evacuation of Buildings Regulations 1992)."

(Amendment No. 2, October 1999)