COMMITTEE REPRESENTATION

This Standard was prepared under the supervision of the P4512 Committee, the Standards Council established under the Standards Act 1988.

The committee consisted of representatives of the following nominating organisations:

Department of Building and Housing
Fire Protection Association of New Zealand
Fire Protection Contractors’ Association of New Zealand
Institution of Fire Engineers
Insurance Council of New Zealand
New Zealand Chapter of the Society of Fire Protection Engineers
New Zealand Fire Equipment Manufacturers’ Association Incorporated
New Zealand Fire Service

ACKNOWLEDGEMENT

Standards New Zealand gratefully acknowledges the contribution of time and expertise from all those involved in developing this Standard.

© COPYRIGHT

The copyright of this document is the property of the Standards Council. No part of the text may be reproduced by photocopying or by any other means without the prior written approval of the Chief Executive Officer of Standards New Zealand unless the circumstances are covered by Part III of the Copyright Act 1994.

Standards New Zealand will vigorously defend the copyright in this Standard. Every person who breaches Standards New Zealand’s copyright may be liable to a fine not exceeding $50,000 or to imprisonment for a term not exceeding 3 months. If there has been a flagrant breach of copyright, Standards New Zealand may also seek additional damages from the infringing party, in addition to obtaining injunctive relief and an account of profits.

Published by Standards New Zealand, the trading arm of the Standards Council, Private Bag 2439, Wellington 6140. Telephone: (04) 498 5990, Fax: (04) 498 5994, Website http://www.standards.co.nz.

<table>
<thead>
<tr>
<th>No.</th>
<th>Date of issue</th>
<th>Description</th>
<th>Entered by, and date</th>
</tr>
</thead>
</table>

AMENDMENTS
## CONTENTS

Committee representation .......................................................... IFC
Acknowledgement ........................................................................ IFC
Copyright .................................................................................... IFC
Referenced documents ................................................................. 4
Latest revisions ............................................................................. 6
Review of Standards ..................................................................... 6
Foreword ....................................................................................... 7
Outcome Statement ....................................................................... 8

### PART 1 GENERAL

101 Scope .................................................................................... 9
102 Objective ............................................................................... 9
103 Interpretation ......................................................................... 10
104 Definitions ............................................................................. 11
105 Declared functional requirements ........................................... 17
106 Types of fire alarms ............................................................... 17
107 Compliance ........................................................................... 17
108 Legislative requirements ......................................................... 18
109 Workmanship, competency, and qualifications ......................... 19
110 Reliability ................................................................................ 19

### PART 2 DESIGN AND CONSTRUCTION – MULTI-ZONE FIRE ALARM SYSTEMS

201 Type and function ................................................................. 20
202 Zones .................................................................................... 20
203 Ancillary services ................................................................. 20
204 Fire alarm ............................................................................. 21
205 Silencing switches .................................................................. 23
206 Manual reset facilities ......................................................... 24
207 Evacuation and alert switches ............................................... 24
208 Defect warning ..................................................................... 24
209 Manual isolation from remote receiving centre ...................... 26
210 Indicators and indicating units .............................................. 26
211 Electrical supply ................................................................. 28
212 Battery charger .................................................................. 29
213 Rechargeable batteries ......................................................... 30
214 Non-rechargeable batteries .................................................. 30
215 Construction of control and indicating equipment ................. 30
216 Detection system ................................................................. 32
217 Manual call points ............................................................... 33
218 Alerting devices .................................................................. 34
219 Addressable fire alarm systems ............................................ 36
220 Environmental tests ............................................................. 36
PART 3 SINGLE-ZONE FIRE ALARM SYSTEMS
301 Functions, limitations, and components ..................................................... 41

PART 4 INSTALLATION
401 Zones and sectors ......................................................................................... 42
402 Installation practice ........................................................................................ 44
403 Equipment location ......................................................................................... 48
404 Manual call point locations ............................................................................ 50
405 Detector selection, location, position, spacing, and coverage .................... 51
406 Alerting devices .............................................................................................. 62
407 Multi-point aspirating smoke detectors ...................................................... 64
408 Delay timers ................................................................................................... 66
409 Owner isolation facilities ................................................................................ 67
410 Hazardous area installations ......................................................................... 67

PART 5 COMMISSIONING
501 General .......................................................................................................... 68
502 Visual examination .......................................................................................... 68
503 Tests on electrical equipment ......................................................................... 69
504 Tests to verify correct operation and function ............................................... 70
505 Documents ...................................................................................................... 71
506 Certificate of completion ............................................................................... 71
507 System passwords .......................................................................................... 71

PART 6 MAINTAINING SYSTEMS IN COMPLIANCE AND GOOD WORKING ORDER
601 General .......................................................................................................... 72
602 Monthly checks and tests ............................................................................... 73
603 Annual checks and tests ................................................................................. 74
604 Emergency warning and intercommunication systems (EWIS) – additional requirements......................................................................................... 76

PART 7 PRECAUTIONS TO BE TAKEN WHEN A FIRE ALARM IS RENDERED INOPERATIVE
701 General .......................................................................................................... 77
702 Notification ...................................................................................................... 77
703 Permanent disconnection ............................................................................... 77
704 Authorisation ................................................................................................. 77
Appendix
A Signalling to a remote receiving centre (Normative)............................78
B Types of fire alarms (Informative).........................................................83
C Supplementary detectors and systems (Informative)...........................85
D Specification for heat actuated fire detectors (Normative)....................86
E Specification for manual call points (Normative).................................95
F Audible altering signals (Normative)......................................................97
G Standard zone index symbols (Normative)..........................................99
H Selection and location of fire detectors (Informative)..........................100
J Certificate of completion for fire alarm system (Normative)..................105
K Notification forms – Fire alarm isolation (Normative)........................107
L Guidelines for assessment of competence and qualification
  (Informative).....................................................................................110
M Summary of key changes in NZS 4512:2010 (Informative)...............114

Figure
1 Typical detector locations at apex of ceiling, roof, or surface...............55
2 Effect of protrusions (beam, joist, purlin etc.) on detector location
  and spacing ......................................................................................57
3 Protection of built-in storage enclosures (for example cupboards
  and wardrobes) flowchart .................................................................58
A1 Example layout of zones and sectors..............................................81
D1 Ball pressure apparatus....................................................................89
D2 Resistance to shock test....................................................................90
D3 Rate of rise heat-actuated fire detectors.........................................92
E1 Typical notice to be displayed on, or adjacent to, each manual
  call point ............................................................................................95
F1 Typical evacuation signal.................................................................98
F2 Alert signal.......................................................................................98
K1 Typical form for notifying that an installation is to be rendered
  inoperative .......................................................................................108
K2 Typical notice of system impairment..............................................109

Table
G1 Symbols .............................................................................................99
H1 Recommended fire detectors for different applications....................104

Index ....................................................................................................118
REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZS 4514:2009</td>
<td>Interconnected smoke alarms for houses</td>
</tr>
<tr>
<td>NZS 4515:2009</td>
<td>Fire sprinkler systems for life safety in sleeping occupancies (up to 2000 m²)</td>
</tr>
<tr>
<td>NZS 4541:2007</td>
<td>Automatic fire sprinkler systems</td>
</tr>
<tr>
<td>NZS 7702:1989</td>
<td>Specification for colours for identification, coding and special purposes</td>
</tr>
<tr>
<td>NZS ISO/IEC 17025:2005</td>
<td>General requirements for the competence of testing and calibration laboratories</td>
</tr>
</tbody>
</table>

JOINT AUSTRALIAN / NEW ZEALAND STANDARDS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS/NZS 3000:2007</td>
<td>Electrical installations (known as the Australian/New Zealand Wiring Rules)</td>
</tr>
<tr>
<td>AS/NZS 3013:2005</td>
<td>Electrical installations – Classification of the fire and mechanical performance of wiring system elements</td>
</tr>
<tr>
<td>AS/NZS 3100:2009</td>
<td>Approval and test specification – General requirements for electrical equipment</td>
</tr>
<tr>
<td>AS/NZS 4130:2009</td>
<td>Polyethylene (PE) pipes for pressure applications</td>
</tr>
<tr>
<td>AS/NZS 5000:- - - - Part 2:2006</td>
<td>Electric cables – Polymeric insulated For working voltages up to and including 450/750 V</td>
</tr>
<tr>
<td>Part 3:2003</td>
<td>Multicore control cables</td>
</tr>
<tr>
<td>AS/NZS ISO/IEC 17020:2000</td>
<td>General criteria for the operation of various types of bodies performing inspection</td>
</tr>
<tr>
<td>AS/NZS 61000:- - - - Part 4.3:2006</td>
<td>Electromagnetic compatibility (EMC) Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test</td>
</tr>
</tbody>
</table>

INTERNATIONAL STANDARDS

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 7240: - - - - Part 5:2003</td>
<td>Fire detection and alarm systems Point-type heat detectors</td>
</tr>
<tr>
<td>Part 6:2004</td>
<td>Carbon monoxide fire detectors using electro-chemical cells</td>
</tr>
<tr>
<td>Part 7:2003</td>
<td>Point-type smoke detectors using scattered light, transmitted light or ionization</td>
</tr>
<tr>
<td>Part 8:2007</td>
<td>Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor</td>
</tr>
<tr>
<td>Part 10:2007</td>
<td>Point-type flame detectors</td>
</tr>
<tr>
<td>Part 11:2005</td>
<td>Manual call points</td>
</tr>
<tr>
<td>Part 12:2006</td>
<td>Line type smoke detectors using a transmitted optical beam</td>
</tr>
<tr>
<td>Part 15:2004</td>
<td>Point-type fire detectors using scattered light, transmitted light or ionization sensors in combination with a heat sensor</td>
</tr>
<tr>
<td>Part 20:2010</td>
<td>Aspirating smoke detectors</td>
</tr>
</tbody>
</table>
Part 27:2009  Point-type fire detectors using a scattered-light, transmitted-light or ionization smoke sensor, an electrochemical-cell carbon-monoxide sensor and a heat sensor

ISO 9001:2008  Quality management systems – Requirements

AMERICAN STANDARD

ASTM B117-09  Standard practice for operating salt spray (fog) apparatus

AUSTRALIAN STANDARDS

AS 1603:- - - -  Automatic fire detection and alarm systems
        Part 1:1997  Heat detectors
        Part 2:1997  Point type smoke detectors
        Part 7:1996  Optical beam smoke detectors
        Part 8:1996  Multi-point aspirated smoke detectors
        Part 14:2001  Point type carbon monoxide (CO) fire detectors

AS 1670: - - - -  Fire detection, warning, control and intercom systems – System design, installation and commissioning
        Part 4:2004  Sound systems and intercom systems for emergency purposes

AS 1851:2005  Maintenance of fire protection systems and equipment

AS 2220:- - - -  Emergency warning and intercommunication systems in buildings
        Part 1:1989  Equipment design and manufacture

AS 7240: - - - -  Fire detection and alarm systems
        Part 5:2004  Point-type heat detectors
        Part 6:2006  Carbon monoxide fire detectors using electro-chemical cells
        Part 7:2004  Point-type smoke detectors using scattered light, transmitted light or ionization
        Part 8:2007  Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor
        Part 10:2007  Point-type flame detectors
        Part 12:2007  Line type smoke detectors using an optical light beam
        Part 15:2004  Multisensor fire detectors

AS 60529:2004  Degrees of protection provided by enclosures (IP Code)

SAA HB 20:1996  Graphical symbols for fire protection drawings

BRITISH STANDARDS

BS EN 54:- - - -  Fire detection and fire alarm systems
        Part 5:2001  Heat detectors. Point detectors
        Part 7:2001  Smoke detectors. Point detectors using scattered light, transmitted light or ionization
        Part 10:2002  Flame detectors. Point detectors
        Part 11:2001  Manual call points
        Part 12:2002  Smoke detectors. Line detectors using an optical light beam
        Part 20:2006  Aspirating smoke detectors

BS EN 50130:- - - -  Alarm systems. Electromagnetic compatibility
        Part 4:1996  Product family standard: Immunity requirements for components of fire, intruder and social alarm systems
BS EN 60068-2:- - - - Environmental testing
  Part 2:2007 Tests. Test B. Dry heat
  Part 78:2002 Test methods. Test Cab. Damp heat, steady state
BS EN 61672:- - - - Electroacoustics – Sound level meters
  Part 1:2003 Specifications

OTHER PUBLICATIONS

Department of Building and Housing

UL 268:2009 Smoke detectors for fire protective signalling systems
UL 521:2002 Heat detectors for fire protective signalling systems

NEW ZEALAND LEGISLATION

Building Act 2004
Building Regulations 1992
Building (Forms) Regulations 2004
Electricity (Safety) Regulations 2010
Fire Safety and Evacuation of Buildings Regulations 2006
Fire Service Act 1975
New Zealand Building Code Handbook and Compliance Documents
Radiocommunications Regulations 2001

LATEST REVISIONS

Amendments to referenced New Zealand and Joint Australian/New Zealand Standards can be found on http://www.standards.co.nz.

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 6140.
FOREWORD

This Standard provides a complete specification for the design, manufacture, installation, and maintenance of building alarm systems, whether operated manually or automatically, in the event of fire. It is intended that this revised and updated Standard will continue to be used as an integral part of the Acceptable Solutions of the Compliance Documents to the New Zealand Building Code (NZBC), and also to facilitate New Zealand Fire Service approval of evacuation schemes under the Fire Safety and Evacuation of Buildings Regulations.

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

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

This edition is a limited technical revision of, and supersedes, NZS 4512:2003. It incorporates material from formal interpretations issued to that Standard, changes to the NZBC Compliance Documents, plus a number of enhancements, corrections, and clarifications requested by users. Appendix M provides a list of all non-editorial changes for this revision. The process for formal interpretations has also now been included in the document.

The intention of this revision to NZS 4512:2003 is to ensure that the Standard remains a dynamic document that adapts with the challenges and changes experienced by the fire protection industry. This revision will help prevent the loss of life and provide better protection of buildings for all New Zealanders.

No significant changes have been made in equipment design requirements; the majority of changes relate to installation, documentation, procedures, and inspection – primarily focused on getting things ‘right first time’ and clarifying areas of ambiguity or practical difficulty. Adjustments to some general requirements have been made for special situations and challenging environments.

The impracticality of traditional high-voltage insulation (‘Megger’) testing of leakage to earth in the presence of electronic detection devices and modern (for example analogue addressable) circuitry techniques has been acknowledged. System manufacturers are now required to specify test methods appropriate to their equipment.

Qualification and competency requirements for fire alarm contractors have been clarified and updated to reflect both the life-safety-critical nature of fire detection systems, and the advancement of formal NZQA Fire Detection and Alarms qualifications since the 2003 edition. It was noted by the committee that an overwhelming majority of installations were being undertaken by qualified contractors voluntarily certified under an industry-based scheme. While stopping short of mandating such a scheme, guidelines have been provided for the assessment of competence and qualifications. The (Appendix J) Certificate of Completion now includes more information and is clearer about what the various signatories are certifying. These updated provisions reflect the well-established quality assurance principle that one cannot inspect quality into a product but must instead build quality into a process.
As always, the provisions of the Standard have been based on a combination of field experience, the desire to reduce unwanted alarms, best practice, pragmatic conservatism, cost-effectiveness, and sound engineering.

Within the limited-revision project scope, alignment with suitable overseas or international Standards practice has been sought, however this has not been at the expense of reliability and cost-effectiveness in fire protection. In particular new ISO 7240 series detector Standards have been recognised, as has the increasing prevalence of electronic detectors with normally-open electromechanical signalling relay outputs, which are now permitted. An alternative double-action method of operation is also now permitted for manual call points.

In recognition of advances in cabling Standards and practices, and the increased use of networked connections, adjustments have been made to cable specifications which should ease installation and reduce costs.

**OUTCOME STATEMENT**

Application of this Standard will help prevent loss of life and provide optimum fire protection for New Zealand buildings through up-to-date specifications for the design, manufacture, installation, and maintenance of fire detection and alarm systems.
NEW ZEALAND STANDARD

Fire detection and alarm systems in buildings

PART 1 GENERAL

101 Scope

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

101.2 Application
This Standard applies to the following fire alarm systems:

(a) Multi-zone (manual or automatic) – see Part 2;
(b) Single-zone (manual or automatic) – see Part 3.

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

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

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.