

AS 1670.6:2023



STANDARDS
Australia



Fire detection, warning, control and intercom systems — System design, installation and commissioning

Part 6: Smoke alarm systems



AS 1670.6:2023

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- Australian Building Codes Board
- Australian Chamber of Commerce and Industry
- Australian Industry Group
- Australian Institute of Building Surveyors
- CSIRO
- Deafness Forum of Australia
- Engineers Australia
- Engineers Australia/Society of Fire Safety
- Fire Protection Association Australia
- Hydraulic Consultants Association Australasia
- National Electrical and Communications Association
- National Fire Industry Association
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Fire detection, warning, control and intercom systems — System design, installation and commissioning

Part 6: Smoke alarm systems

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Preface

This Standard was prepared by the Standards Australia Committee FP-002, Fire Detection, Warning, Control and Intercom Systems, to supersede AS 1670.6—1997.

The objective of this document is to facilitate the design, installation and commissioning of smoke alarm systems used in both domestic and residential accommodation.

The major changes in this revision are as follows:

- (a) Application of a smoke alarm system from a simple domestic dwelling to all classes of residential accommodation buildings.
- (b) Use of external power supplies and the supervision of their transmission paths.
- (c) Recognition of combination and multi-criteria smoke alarms.
- (d) Zoning of smoke alarms.
- (e) Inclusion of connectable devices as additions to the smoke alarm system.
- (f) Restriction of smoke alarm locations to ceiling heights less than 9 m.

This edition also permits the use of multiple editions of Standards relating to components. [Table 1.8](#) lists permitted editions of referenced standards which apply throughout this document.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

This document includes a commentary on some of the clauses. The commentary directly follows the relevant clause, is designated by “C” preceding the clause number and is printed in italics in a box. The commentary is for information and guidance and does not form part of the document.

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NOTES

Australian Standard®

Fire detection, warning, control and intercom systems — System design, installation and commissioning

Part 6: Smoke alarm systems

Section 1 Scope and general

1.1 Scope

This document sets out requirements for the design, installation and commissioning of smoke alarm systems (SAS) comprising components that conform to applicable Standards.

Systems may consist of smoke alarms that are stand-alone, interconnected, or connected to residential control and indicating equipment (RCIE).

1.2 This has been deliberately left blank

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1603.3, *Automatic fire detection and alarm systems, Part 3: Heat alarms*

AS 1603.17, *Automatic fire detection and alarm systems, Part 17: Warning equipment for people with hearing impairment*

AS 3786, *Smoke alarms using scattered light, transmitted light or ionization*

AS(/NZS) 4029 (all parts), *Stationary batteries—Lead-acid*

AS 7240.2, *Fire detection and alarm systems, Part 2: Fire detection control and indicating equipment (ISO 7240-2:2017, MOD)*

AS 7240.4, *Fire detection and alarm systems, Part 4: Power supply equipment (ISO 7240-4:2017, MOD)*

AS 7240.13, *Fire detection and alarm systems, Part 13: Compatibility assessment of system components (ISO 7240-13:2018 (ED.2.0) MOD)*

AS/NZS 3000, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*

AS/NZS 3013, *Electrical installations—Classification of the fire and mechanical performance of wiring system elements*

AS/NZS IEC 61672-1, *Electroacoustics – Sound level meters, Part 1: Specifications*

AS ISO 7240-3, *Fire detection and alarm systems, Part 3: Audible alarm devices*

AS ISO 7240-11, *Fire detection and alarm systems, Part 11: Manual call points*

AS ISO 7240-18, *Fire detection and alarm systems, Part 18: Input/output devices*

AS ISO 7240-23, *Fire detection and alarm systems, Part 23: Visual alarm devices*

AS/CA S009, *Installation requirements for customer cabling (Wiring rules)*

ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals*

ISO 8201, *Alarm systems — Audible emergency evacuation signal — Requirements*

1.4 Terms and definitions

For the purposes of this document, the terms and definitions given in AS 2484.2, the National Construction Code (NCC) and the following apply.

1.4.1

alarm acknowledgment facility

AAF

configuration of residential control and indicating equipment in conjunction with equipment for occupant use to provide a delay for an occupant to clear nuisance *alarm device* ([1.4.2](#)) activation before the activation is processed as a *fire alarm condition* ([1.4.12](#))

1.4.2

alarm device

component designed to respond to smoke and other physical phenomena of fire and provide an audible alarm signal

1.4.3

alarm zone

area protected by one or more *alarm devices* ([1.4.2](#)) which provides a common identification at the residential control and indicating equipment

1.4.4

baseline data

data derived from the approved design and commissioning which serves as a basis for subsequent comparison with the data derived from inspection, test and survey

1.4.5

combination alarm

alarm device ([1.4.2](#)) incorporating more than one fire sensor within a single housing with each sensor conforming to a separate Standard

1.4.6

connectable device

device whose operation or failure will not jeopardize the performance of the *smoke alarm system* ([1.4.27](#))

EXAMPLE Carbon monoxide alarms, door hold open devices, mimic panels or interfaces to graphic displays, building monitoring and control systems or for external monitoring.

Note 1 to entry: There is no component Standard to which a connectable device is required to conform.

Note 2 to entry: Component standards are listed in [Clause 1.3](#).

1.4.7

customer cabling

as defined in AS/CA S009

1.4.8

distributed parts

<residential control and indicating equipment> parts of the equipment not located in a single cabinet

1.4.9

egress path

specified path followed by occupants to evacuate from an occupied area of a building in an emergency

1.4.10
end of line device
ELD

device installed at the end of a *transmission path* ([1.4.34](#)) providing a signal to residential control and indicating equipment in order to supervise the transmission path

1.4.11
extra-low voltage customer cable
ELV

cable carrying a voltage defined as extra-low voltage in AS/CA S009

1.4.12
fire alarm condition

condition within the *smoke alarm system* ([1.4.29](#)) that is initiated by an *alarm device* ([1.4.2](#)) responding to smoke or other physical phenomena of fire

1.4.13
interconnected smoke alarms

alarms that can be connected to other compatible alarms in order to provide a common *fire alarm condition* ([1.4.12](#))

1.4.14
level surface

surface, roof or ceiling with a slope less than or equal to 1:10

1.4.15
locate facility

control facility located remotely from the *alarm device* ([1.4.2](#)) and used in conjunction with the interconnected alarm devices that enables alarm devices in the *alarm condition* ([1.4.12](#)) to be identified

1.4.16
low voltage
LV

<power> voltage as defined in AS/NZS 3000

<customer cabling> as defined in AS/CA S009

1.4.17
main power source

source of power intended to supply the *smoke alarm system* ([1.4.29](#))

1.4.18
may

indicates the existence of an option

1.4.19
multi-criteria smoke alarm

smoke alarm incorporating within the one mechanical housing a smoke sensor plus one or more additional sensors with all sensors separately monitored for the presence or absence of an output signal relating to fire development where the individual signal from both sensors is evaluated to determine when an alarm condition is reached

1.4.20
occupied area

area of a building or dwelling requiring the installation of *alarm devices* ([1.4.2](#))

Note 1 to entry: See [Clause 3.2.2](#) for the requirements related to occupied areas.

1.4.21
protected area

area of a building with a *smoke alarm system* ([1.4.29](#)) installed

1.4.22**protected building**

building equipped with an automatic fire detection and alarm system

1.4.23**public corridor**

as defined in the NCC

1.4.24**remote access**

temporary connection of connectable devices to fire detection control and indicating equipment from a location physically distant from the equipment

Note 1 to entry: The connection is achieved by, but not limited to, the use of cellular technology, internet-based technology, radio frequency technology, or any combination.

Note 2 to entry: Connection of connectable devices to conduct testing and maintenance in accordance with AS 1851 within the same building as the fire detection control and indicating equipment is not considered remote access.

1.4.25**shall**

indicates that a statement is mandatory

1.4.26**should**

indicates a recommendation

1.4.27**sloping ceiling**

any surface, roof, or ceiling with a slope greater than 1:10

1.4.28**smoke**

visible suspension in air of solid or liquid particles or gases resulting from combustion or pyrolysis and entrained air

1.4.29**smoke alarm system****SAS**

equipment arranged in a specific configuration that detects fire and provides occupant warning

Note 1 to entry: In addition to smoke alarms, the SAS may include *connectable devices* ([1.4.6](#)) supplementary warning devices and other fire detection technology.

1.4.30**sole occupancy unit****SOU**

as defined in the NCC

1.4.31**sound pressure level—A-weighted****SPL**

logarithmic measure of the ratio of a sound pressure over a reference sound pressure corresponding to the hearing of a human ear using the A-weighted network

Note 1 to entry: Sound pressure is expressed as the ratio to the reference pressure of 20 µPa at 1 kHz, in A-weighted decibels dB(A).

Note 2 to entry: The A-weighting characteristics are given in AS/NZS IEC 61672.1.

1.4.32**standby power source**

source of power intended to supply the *smoke alarm system* ([1.4.29](#)) in the event that the *main power source* ([1.4.17](#)) is unavailable

1.4.33**supervised**

monitored for fault conditions in the quiescent state

1.4.34**transmission path**

connection, external to cabinets, between parts of the *smoke alarm system* ([1.4.29](#)) for the transmission of information or power

1.4.35**transmission path fault**

condition in the *transmission path* ([1.4.34](#)) preventing the correct transmission of information or power

1.5 Abbreviations

AAD	Audible alarm device
CIE	Control and indicating equipment
ELD	End of line device
ELV	Extra-low voltage
LV	Low voltage
MCP	Manual call point
PSE	Power supply equipment
RCIE	Residential control and indicating equipment
SAS	Smoke alarm system
SOU	Sole occupancy unit
SPL	Sound pressure level
VAD	Visual warning device

1.6 Measurements**1.6.1 Tolerances**

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

Where decibel (dB) is used as a measurement unit, a tolerance of ± 2 dB shall be applied.

1.6.2 Spacing

When determining the location of alarm devices, measurements shall be taken from the centre line of the alarm device, see [Figure 1](#).

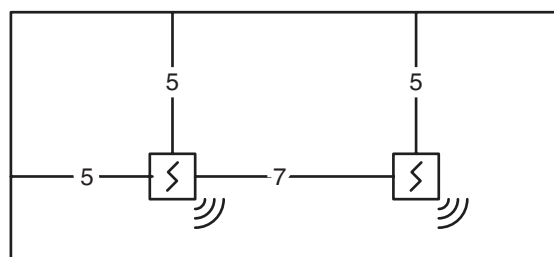


Figure 1 — Centre-line measurement

1.7 Systems design

1.7.1 General

The smoke alarm system (SAS) shall be designed and installed in accordance with [Sections 2, 3, 4, 5, 6](#) and [7](#). The system design shall include the details and documentation for both installation and commissioning of the system.

1.7.2 Baseline data

The design, installation and commissioning documentation (see [Appendices E, G](#) and [H](#)) shall be provided to facilitate the routine service of the SAS for the period of its service life. The baseline data shall include, but not be limited to, the following:

- (a) Site identifier.
- (b) Address.
- (c) Building number or name (if applicable).
- (d) Type of system — stand-alone smoke alarm, interconnected smoke alarms or RCIE.
- (e) Reference to this document, i.e. AS 1670.6.
- (f) Statement confirming that the equipment and components used within the system conform to the applicable standards.
- (g) Final design drawings (“as built”) showing the installed system layout (building plans), equipment type, locations, alarm zone number, device designation and transmission paths as applicable. The symbols in [Figure D.1](#) shall be used.
- (h) Systems interface diagram — where, under fire alarm conditions, the SAS controls such things as VADs, door release or emergency lighting activation.
- (i) List of all system components, their location, type, unique system designation and descriptor.
- (j) List of each system component having a fixed service life, nominating the service date.
- (k) List of any connectable devices.
- (l) Manuals for all CIE and system components (as applicable).
- (m) List of each supplementary warning device.
- (n) Power supply requirements include (if applicable):
 - (i) Main power source, nominal voltage and source.

- (ii) Standby power source, nominal voltage and capacity and the compensation factor used if installed outside an average temperature range of 15 °C to 30 °C.
- (iii) System quiescent current (A), including remote monitoring equipment loads.
- (iv) System alarm current (A), including connectable device load.
- (v) Load current (A) of each connectable device transmission path.

NOTE The required baseline data and the specific details of the SAS should reflect the complexity of the system being installed. This baseline data are provided to enable the comparison of the system data to the approved design and determine the effectiveness of ongoing routine service.

1.7.3 Alteration or connection to existing installations

Alterations (including changes to site specific data) to an existing installation shall be designed and installed in accordance with this document. This only applies to equipment and transmission paths which are added, removed, relocated or replaced.

NOTE Where existing equipment is being relocated, the equipment does not require upgrading to conform to the latest Standard.

The alteration shall be —

- (a) compatible with the existing system;
- (b) only used within the limitations detailed in the component hardware documentation;
- (c) perform the required functions in accordance with this document;
- (d) be tested to demonstrate correct operation; and
- (e) be tested to demonstrate the correct operation of the remainder of the existing installation.

Power supply requirements shall be recalculated and upgraded as necessary to ensure the system can accommodate additional loads.

Where existing wiring is required to be joined, fixed terminal strips utilizing clamp-type connectors shall be used. Where these joins are made outside an RCIE, they shall be housed in a cabinet and be labelled "FIRE" in a contrasting colour to the background with a lettering size of not less than 5 mm.

Where the SAS is divided into alarm zones, in addition to updating the documentation detailed in [Clause 1.6.2](#) the zone block plan shall be revised to include the alterations.

1.8 Application of normative references

[Table 1.8](#) lists those Standards which have more than one edition that may be used to meet the requirements of this document.

Table 1.8 — Acceptable editions of normative reference standards

Standard	Acceptable editions
AS 3786	2014 (incorporating Amendments 1 and 2) 2023
AS ISO 7240.18	2015 2018

Section 2 System configuration

2.1 System components

2.1.1 General

Smoke alarm system (SAS) components shall conform to at least one of the applicable component Standards specified in this document and shall be installed in the format detailed in the component hardware documentation including any limitations of use identified.

As a component of an SAS, combination and multi-criteria smoke alarms shall conform to AS 3786.

The minimum SAS shall comprise smoke alarms conforming to AS 3786. Where additional alarm devices such as heat alarms form part of the SAS, all additional alarm devices shall be interconnected to the smoke alarms or connected to the RCIE.

RCIE, heat alarms or other supplementary components may be used in addition to any required smoke alarms to provide additional coverage or functionality.

Where the SAS uses external power supply equipment (PSE) to provide both the main and standby power sources, the PSE shall meet the requirements of [Clause 4.4](#).

NOTE 1 The PSE may form part of the RCIE.

NOTE 2 Components should be suitable for the environment in which they are installed. Environmental conditions such as high temperature, dampness, dust, corrosion, vibration, and shock may be experienced.

AS 7240.13 shall be used to determine the compatibility of components.

2.1.2 Components

The components in the system shall conform to the applicable Standards specified in this document.

Components installed within the SAS shall be compatible in the configuration in which they have been installed.

Interconnection of alarm devices shall be in accordance with the component hardware documentation.

The system shall comprise smoke alarms conforming to AS 3786 and any of the following equipment:

- (a) RCIE.
- (b) Power supply equipment conforming to AS 7240.4.
- (c) Heat alarms conforming to AS 1603.3.
- (d) Supplementary warning equipment for people with hearing impairment conforming to AS 1603.17.
- (e) Manual call points conforming to AS ISO 7240.11.
- (f) Visual alarm devices conforming to AS ISO 7240.23.
- (g) Audible alarm devices conforming to AS ISO 7240.3.

2.1.3 Provision of residential control and indicating equipment (RCIE)

Where the SAS is reliant on the operation of an RCIE to control or operate system components or connectable devices, the RCIE shall conform to AS 7240.2. The fire alarm condition may automatically reset at the RCIE when the alarm devices reset from the alarm state.

An RCIE shall be capable of stand-alone operation.

An RCIE shall protect only one building.

2.1.4 Connectable devices

Where connectable devices such as mimic panels, graphic displays, and building monitoring and control systems are connected to the SAS, the following requirements shall be met:

- (a) The operation of the SAS shall not be reliant on the connectable device.
- (b) Failure of connectable devices shall not adversely affect the correct operation of the SAS.
- (c) All transmission path connections and interfaces to connectable devices shall be installed in accordance with AS/CA S009.

NOTE AS/CA S009 states that it should be read in conjunction with AS/CA S008.

- (d) Transmission paths to connectable devices shall be electrically isolated, fuse-protected or current-limited to prevent a fault on the external wiring of a connectable device from inhibiting the operation of other smoke alarms or the RCIE.
- (e) Connectability of the connectable devices with the RCIE has been assessed.
- (f) Connectable devices shall not have remote access to update firmware or software configurations at Access Level 3 or Access Level 4 as defined in AS 7240.2 unless it is manually enabled at the RCIE.
- (g) Diagnostics, routine service and testing are permitted where the system provides a means to manually terminate remote access at the RCIE. Remote access shall be automatically terminated within 1 h of inactivity. The access level requirements of AS 7240.2 shall apply as if these functions are being performed at the RCIE.
- (h) Remote access shall not be capable of the following functionality:
 - (i) Activate, disable or reset fire alarm conditions.
 - (ii) Disable, silence or reset occupant warning.

AS 7240.13 shall be used to confirm that connectable devices meet the above requirements.

2.2 Smoke alarm system limitations

2.2.1 Unzoned smoke alarm system

Where the SAS does not include an RCIE and comprises more than one smoke alarm, additional heat alarms or other alarm devices, all alarm devices shall be interconnected to provide a common alarm when any individual smoke or heat alarm enters the fire alarm condition.

The number of interconnected devices shall be limited to the number defined in the component hardware documentation but shall not exceed 40 alarm devices.

2.2.2 Zoned smoke alarm systems

Where the SAS comprises more than one smoke alarm, additional heat alarms or other alarm devices, and the SAS is configured as alarm zones, all alarm devices shall be connected to an RCIE.

Each RCIE alarm zone shall be limited to —

- (a) 10 alarm devices;