

Australian Standard™

**Fire detection, warning, control and
intercom systems—Control and
indicating equipment**

**Part 0: General requirements and test
methods**



Standards Australia



Documents

Document Sharing Hub

This Australian Standard was prepared by Committee FP-002, Fire Detection, Warning, Control and Intercom Systems. It was approved on behalf of the Council of Standards Australia on 8 August 1997 and published on 5 December 1997.

The following are represented on Committee FP-002:

Audio Engineering Society
Australian Building Codes Board
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Australian Fire Authorities Council
Commonwealth Fire Board
Deafness Forum of Australia
Department of Defence
Fire Protection Association Australia
Fire Protection Industry Contractors Association of New Zealand
National Electrical Contractors Association of Australia
New Zealand Fire Equipment Association
New Zealand Fire Protection Association
Property Council of Australia
Scientific Services Laboratory AGAL —Department of Administrative Affairs
Telstra Corporation

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 96379 (in part)..

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 4428.0—1997

**Fire detection, warning, control and intercom systems—Control and indicating
equipment**

Part 0: General requirements and test methods

RECONFIRMATION NOTICE

Technical Committee FP-002 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 16 June 2016.

The following are represented on Technical Committee FP-002:

Association of Hydraulic Services Consultants Australia
Australasian Fire and Emergency Service Authorities Council
Australian Building Codes Board
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Institute of Building Surveyors
CSIRO
Deafness Forum of Australia
Department of Human Services (VIC)
Engineers Australia
Fire Protection Association Australia
National Electrical and Communications Association
National Fire Industry Association
Property Council of Australia
Society of Fire Safety

NOTES

Australian Standard™

Fire detection, warning, control and intercom systems—Control and indicating equipment

Part 0: General requirements and test methods

First published as AS 4428.0—1997.
Reissued incorporating Amendment No. 1 (October 2002).

COPYRIGHT

© Standards Australia International

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia
ISBN 0 7337 1442 0

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee FP/2, Fire Detection, Warning, Control and Intercom Systems, as part of a suite of Standards for control and indicating equipment (CIE), and is the result of a consensus among representatives on the Committee to produce it as an Australian Standard.

This Standard incorporates Amendment No. 1 (October 2002). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, not, table, figure, or part thereof affected.

This Part of this Standard provides for the common requirements for design, construction and testing of control and indicating equipment used for fire detection, warning, control and indicating systems.

Those aspects relating to circuit design and construction, component derating and long-term reliability are largely the responsibility of the equipment designer. The designer should be aware of other relevant Standards relating to quality and reliability of equipment.

The assessment of the performance of the equipment under the various test conditions specified is intended to be a measure of the reliability of the equipment during its most onerous service. The temperature/humidity tests specified are selected from the relevant Parts of IEC 68, Environmental testing, and are those considered most closely related to the Australian climate.

Fire detection and alarm systems must be protected against failure due to voltage transients induced into the system. Equipment needs to be designed to withstand the effects of the transients and for this reason transient voltage tests which include tests for impulse voltage withstand and high frequency disturbance are included in this Standard.

The term 'normative' has been used in this Standard to define the application of the appendix to which it applies. A 'normative' appendix is an integral part of a Standard.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE.....	4
1.2 APPLICATION	4
1.3 REFERENCED DOCUMENTS.....	4
1.4 DEFINITIONS.....	5
1.5 GENERAL REQUIREMENTS.....	5
1.6 COMPLIANCE WITH OTHER STANDARDS	6
1.7 INTERPRETATION OF SPECIFIED LIMITING VALUES.....	6
1.8 ‘Not applicable’	6
SECTION 2 DESIGN AND CONSTRUCTION	
2.1 GENERAL.....	7
2.2 ELECTRICAL	7
2.3 MECHANICAL.....	8
2.4 MARKING AND IDENTIFICATION.....	9
2.5 SOFTWARE CONTROLLED EQUIPMENT.....	9
2.6 WARNING SIGNAL TONES	10
SECTION 3 DOCUMENTATION	
3.1 OPERATING INSTRUCTIONS.....	11
3.2 INSTALLATION AND MAINTENANCE DOCUMENTATION	11
3.3 HAZARDOUS LOCATIONS	12
SECTION 4 ASSESSMENT OF COMPLIANCE	
4.1 GENERAL.....	13
4.2 FUNCTIONAL ASSESSMENT	13
4.3 TESTS	13
4.4 COMPATIBILITY ASSESSMENT.....	17
4.5 REPORTING.....	17
SECTION 5 VARIATION FROM COMPLIANT EQUIPMENT	
5.1 MINOR VARIATIONS	18
5.2 SIGNIFICANT VARIATIONS.....	18
5.3 MAJOR VARIATIONS	19
APPENDICES	
A OPERATIONAL TEST	20
B TRANSIENT VOLTAGE TESTS	21
C ELECTROMAGNETIC COMPATIBILITY TEST PROCEDURES	27
D ELECTROSTATIC DISCHARGE TESTS	34
E COMPATIBILITY ASSESSMENT.....	36

STANDARDS AUSTRALIA

Australian Standard

Fire detection, warning, control and intercom systems—Control and indicating equipment

Part 0: General requirements and test methods

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the common requirements and the performance criteria for control and indicating equipment (CIE) used in fire detection, warning, control and intercom systems.

1.2 APPLICATION

The requirements of this Standard apply to CIE forming part of a fire detection, warning, control and intercom system and complying with one or more of the other parts of this Standard.

1.3 REFERENCED DOCUMENTS

A1 The following documents are referred to in this Standard:

AS	
1217	Acoustics—Determination of sound power levels of noise sources
1217.1	Part 1: Guidelines for the use of basic Standards for the preparation of noise test codes
1931	High-voltage testing techniques
1931.1	Part 1: General definitions and testing requirements
1939	Degrees of protection provided by enclosures for electrical equipment (IP Code)
2362	Automatic fire detection and alarm systems—Methods of test for actuation devices
2362.25	Method 25: Indicator visibility test
2484	Fire—Glossary of terms
2484.2	Part 2: Fire protection and firefighting equipment
2546	Printed boards
2546.3	Part 3: Design and use
2706	Numeric values—Rounding and interpretation of limiting values
AS/NZS	
3000	Electrical installations—Buildings, structures and premises (known as the Australian/New Zealand Wiring Rules)
3100	Approval and test specification—General requirements for electrical equipment
3108	Approval and test specification—Particular requirements for isolating transformers and safety isolating transformers

A1

AS/NZS

3260 Approval and test specification—Safety of information technology equipment including electrical business equipment

CISPR22 Information technology equipment—Radio disturbance characteristics—Limits and methods of measurement

ISO

7731 Danger signals for work places—Auditory danger signals

8201 Acoustics; Audible emergency evacuation signal

IEC

60068 Environmental testing

60068-2 Part 2: Tests

60068-2-1 Tests A: Cold

60068-2-2 Tests B: Dry heat

60068-2-3 Tests Ca: Damp heat, steady state

60068-2-32 Test Ed: Free fall

60249 Base materials for printed circuits

60249-2 Part 2: Specifications (all parts)

61000 Electromagnetic compatibility (EMC)

61000-4 Part 4: Testing and measurement techniques

61000-4-2 Section 2: Electrostatic discharge immunity test

61810 Electromechanical all or nothing relays

61810-7 Part 7: Test and measurement procedures

UL

94 Tests for flammability of plastic materials for parts in devices and appliances

1.4 DEFINITIONS

For the purpose of this Standard the definitions given in AS 2484.2 and those below apply.

1.4.1 Firmware

The basic operating program which is not intended to be field changeable.

1.4.2 Interface

The interconnection between equipment which permits the transfer of information.

1.4.3 Power supply

That portion of CIE equipment which provides a common source of power for operation of the CIE equipment.

1.4.4 Software

The combination of firmware and site specific data which controls the overall operation of the CIE.

1.5 GENERAL REQUIREMENTS

A1

Externally energized circuits at voltages in excess of extra low voltage (ELV), except the power source supply for CIE, shall not be permitted to enter the enclosures.

The individual parts of the fire detection and alarm system shall be compatible.

1.6 COMPLIANCE WITH OTHER STANDARDS

1.6.1 General

AS 3100 shall be read in conjunction with this Standard.

1.6.2 Requirements of other Standards

All components incorporated in the system shall comply with the applicable requirements of the Standards listed in Clause 1.3.

Where functional components of CIE physically form part of an actuating device or its base, for which there is a separate Standard, and conflict exists between the two Standards, the requirements of the actuating device Standard shall prevail.

1.7 INTERPRETATION OF SPECIFIED LIMITING VALUES

For the purpose of assessing compliance with this Standard, the specified values herein shall be interpreted in accordance with the 'rounding method' described in AS 2706, i.e. the observed or calculated value shall be rounded to the same number of figures as in the specified limiting value and then compared with the specified limiting value. For example, for specified limiting values of 2.5, 2.50 and 2.500, the observed or calculated value would be rounded to the nearest 0.1, 0.01 and 0.001 respectively. For examples of interpolation of specific values in accordance with the rounding method, see AS 2706.

A1 | 1.8 'Not applicable'

SECTION 2 DESIGN AND CONSTRUCTION

2.1 GENERAL

2.1.1 Operating environment

The equipment shall be suitable for an operating environment within the temperature range -5°C to $+45^{\circ}\text{C}$ and shall be designed to comply with the performance requirements specified in Section 4.

2.1.2 Security

The equipment shall be such that it can be secured against unauthorized operation, e.g. by locked doors, or by control functions enabled by a key-operated device. The key shall be removable only when the CIE is in the secure position.

2.1.3 Installation height

All required indicators and controls shall be designed for installation heights between 0.75 m and 1.85 m from floor level.

2.1.4 Telecommunications lines

Equipment intended to be connected to external telecommunications lines shall comply with the relevant Austel specifications.

2.1.5 Controls

Controls shall be provided with a means of feedback to confirm operation. The feedback shall be tactile, visible or audible, and shall be readily recognized when the associated control is operated.

2.2 ELECTRICAL

2.2.1 Component ratings

The electrical and electronic components shall be suitably rated to withstand the maximum and minimum temperatures that will occur inside the CIE enclosure when subjected to the tests specified in Clause 5.3.2. Equipment design shall ensure that the operating conditions of the components used shall not exceed the limits specified by the component manufacturer.

2.2.2 Voltage

Voltages in excess of ELV shall be physically separated and electrically isolated from ELV operated equipment in accordance with AS 3100.

2.2.3 Printed boards

- ^{A1} The material used for fabrication shall be flame-resistant and equal in quality to that specified in IEC 249.2, Specification 5 (249-2-5-IEC-EP-GC-CU).

NOTES:

- 1 Printed board design should be in accordance with AS 2546.3.
- 2 Epoxide woven glass fabric, copper-clad laminate sheet complying with the requirements of UL 94 for grades V0 and V1 is an acceptable alternative material.

2.2.4 Terminals

Each terminal for the connection of external conductors shall be so designed that it clamps each conductor between metal surfaces with adequate but not excessive contact pressure.

Alternative means of connection may be employed, e.g. plugs and sockets, provided that they are adequate for the purpose.

NOTE: Where plugs and sockets are used, they should be retained in position so as to withstand normal vibration and environmental influences.

Connections to the battery terminals shall be made in accordance with the battery manufacturer's recommendations.

All terminals shall have appropriate current-carrying capacity.

2.2.5 Wiring

The size and materials of the interconnecting wires and their insulation shall be such that the rating of the conductor and insulation is adequate for the circuit applications. All wiring shall be able to carry a current corresponding to any associated protective device rating continuously without overheating.

The routes of wires shall be smooth and free from sharp edges, burrs and any moving parts which may cause abrasion of the insulation, and shall be adequately spaced from hot components.

All wiring shall be held in position without damage to the insulation and shall not be subjected to strain during normal service. Where wires are likely to experience flexing during servicing, they shall be suitable for that duty.

2.2.6 Transformers

Power supply transformers shall comply with AS/NZS 3108 and AS/NZS 3260, as appropriate.

2.3 MECHANICAL

2.3.1 Strength

The mechanical strength of all equipment panels and subassemblies shall be adequate to support the weight of components mounted thereon, and the panels and subassemblies shall be sufficiently rigid to prevent any detrimental effects due to bending or handling throughout the life of the equipment.

2.3.2 Accessibility

The equipment shall be easily accessible for maintenance purposes. Where subassemblies are provided, they shall be capable of removal by the use of ordinary hand tools without the removal of components on the subassembly. Sufficient space from terminal blocks shall be provided to permit easy access for external wiring.

2.3.3 Enclosures and subassemblies

Enclosures and subassemblies shall comply with the following requirements as appropriate:

- (a) The CIE enclosure shall have a protective surface finish suitable for normal operation and environment. Surface treatments such as paint, coatings, plating, or etching shall be completed, uniform and free from scratches or voids.
- (b) Cable entry points shall be provided and shall be sufficient to accommodate incoming and outgoing cabling. The entry points shall be processed at the manufacturing stage of the enclosure.
- A1 (c) The CIE enclosure, including cable entry points, shall comply with AS 1939, IP 30 (Category 2).
- (d) The CIE enclosure shall have adequate space to contain any required logbook.
- (e) Where CIE enclosure doors cover the indicators, a rigid transparent viewing panel shall be provided in the door so that the status of the indicators and their associated labelling can be seen without opening the door. The viewing panel shall be mechanically supported.

- (f) Equipment enclosures shall meet the requirement of AS 3000.

NOTE: Tapped holes in non-metallic materials are generally unsatisfactory and should be avoided by the use of metal inserts arranged so that they will not rotate or loosen. Some types of thermoplastics such as glass-filled nylon, polycarbonate or similar, may be suitable for tapped holes and may be used subject to an agreement between the manufacturer and the testing authority.

2.4 MARKING AND IDENTIFICATION

2.4.1 Enclosure

Each enclosure shall comply with the marking specified in AS 3100 and shall have a prominent and permanently attached nameplate with the following additional information:

- (a) Drawing/serial number.
- (b) Year of manufacture.
- A1 (c) IP rating.

2.4.2 Indicators and controls

- A1 | All CIE indicators and controls shall be indelibly labelled in English with their actual function name or a readily recognizable abbreviation or symbol.

For zone-specific indicators and controls the following shall be immediately apparent from the labelling of each indicator or control:

- (a) The zone to which it relates.
To ensure that the correct zone can be identified if a module is replaced, the labelling of zones shall not be attached to plug-in type modules.
- (b) The operation of each function, as required in the appropriate product Standard, and shall not require the use of any passwords, lists, cross-references or indices.

2.4.3 Terminals

Conductor terminals, plugs and sockets shall be indelibly labelled with their function.

2.4.4 Fuses

Fuses shall be indelibly marked as near as practicable to the fuse-holder with the following information:

- (a) Function.
- (b) Current rating and fuse type.

2.5 SOFTWARE CONTROLLED EQUIPMENT

2.5.1 Program monitoring

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

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

Unsuccessful attempts to re-start the program shall give a fault warning within 30 s of the occurrence of the failure.

2.5.2 Storage of software

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

Firmware shall be held in non-volatile, read-only memory. The current firmware version shall be readily identifiable in situ.

Configuration data shall be safeguarded either as for firmware or shall be—

- (a) modifiable only after access by lock or code at a level additional to that specified in Clause 2.1.2;
- (b) changeable only 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; and
- (e) preserved 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 normal, operational and predictable manner after an interruption of power.

All firmware and configuration data shall be checked for corruption automatically (e.g. by cyclic redundancy check (CRC) procedure) on power restart and at intervals not exceeding 72 hours. A fault condition shall be given in the event of failure of these checks.

A1

2.6 WARNING SIGNAL TONES

The following applies to warning signal tones:

- (a) Alert signals shall comply with ISO 7731.
- (b) Evacuation signals shall comply with ISO 8201.

***C2.6** This Standard does not set specific requirements for the amplifiers used to distribute warning signal tones. The matters that should be considered when designing or selecting an amplifier are those that apply to any equipment used for fire safety systems. Consideration should be given to the use of floating speaker circuits to protect against a single short circuit to earth from preventing the generation of warning tones.*

SECTION 3 DOCUMENTATION

3.1 OPERATING INSTRUCTIONS

Operating instructions shall be supplied for each CIE. The instructions shall be of good quality and made from durable materials. Text shall be written in clear, concise English. The instructions shall include the following:

- (a) Product information, listing—
 - (i) name, address and telephone number of manufacturer;
 - (ii) product name and model number;
 - (iii) reference to the relevant product Standard; and
 - (iv) document number and issue.
- (b) Instructions needed by an operator to manipulate the equipment in performing its intended purpose. The manufacturer shall pay due regard to the qualifications and training to be expected of a normal operator.

3.2 INSTALLATION AND MAINTENANCE DOCUMENTATION

The installation and maintenance document shall be of good quality and made from durable materials. Text shall be written in clear, concise English and shall be easily understandable by a trained technician who is not familiar with the equipment. The documents shall include the following:

- (a) Product information, listing the following:
 - (i) Name, address and telephone number of manufacturer.
 - (ii) Product name and model number.
 - (iii) Details of certification to this Standard.
 - (iv) List of compatible actuating devices.
 - (v) List of compatible batteries and service items.
 - (vi) Provision for equipment serial number and date of manufacture.
 - (vii) Document reference and issue.
 - (viii) Description of equipment including firmware versions to which the document applies.
- (b) Full specification of all relevant operating parameters associated with the CIE, including the following:
 - (i) Maximum system expansion for each function.
 - (ii) Environmental limits, e.g. temperature and humidity.
 - (iii) Cable characteristics, e.g. number of conductors and type of cable.
 - (iv) Maximum number of actuating devices per alarm zone or cable loop.
 - (v) Power supply ratings and battery charger settings.
- (c) A section that shall contain, without reference to other sections of the instructions, the following:
 - (i) Sufficient information to place into operation equipment completely aligned and adjusted.

A1