



Fire detection and alarm systems

Part 24: Fire alarm loudspeakers



AS ISO 7240.24:2018

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- CSIRO
- Deafness Forum of Australia
- Department of Health and Human Services (VIC)
- Engineers Australia
- Fire Protection Association Australia
- National Electrical and Communications Association
- National Fire Industry Association
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Part 24: Fire alarm loudspeakers

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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 ISO 7240.24:2015, *Fire detection and alarm systems, Part 24: Sound-system loudspeakers*.

The objective of this Standard is to specify requirements, test methods and performance criteria for loudspeakers intended to broadcast a warning of fire between a fire detection and alarm system and the occupants of a building (refer to AS ISO 7240.1:2018, Figure 1, Item C).

This Standard specifies loudspeakers for two types of application environment: type A, generally for indoor use, and type B, generally for outdoor use.

This Standard does not cover loudspeakers for special applications, for example, loudspeakers for use in hazardous applications, if such applications require additional or other requirements or tests other than those given in this Standard.

This Standard is not intended to cover addressable loudspeakers or loudspeakers with active components.

Audible alarm indicators are covered in AS ISO 7240.3.

This Standard is identical with, and has been reproduced from, ISO 7240-24:2016, *Fire detection and alarm systems — Part 24: Fire alarm loudspeakers*.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text “this part of ISO 7240” should read “this Australian Standard”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

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

Contents

Preface	ii
Foreword	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms, definitions, symbols and abbreviated terms	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	4
4 Requirements	5
4.1 Compliance	5
4.2 Frequency response limits	5
4.3 Durability	5
4.4 Construction	6
4.4.1 Provision for external conductors	6
4.4.2 Materials	6
4.4.3 Ingress protection	6
4.4.4 Access	6
5 Tests	6
5.1 General	6
5.1.1 Atmospheric conditions for tests	6
5.1.2 Operating conditions for tests	7
5.1.3 Mounting arrangements	7
5.1.4 Tolerances	7
5.1.5 Frequency response measurement and sensitivity calculation	7
5.1.6 Frequency response measurement and sensitivity calculation for loudspeakers requiring dedicated system equalization	8
5.1.7 Provision for tests	9
5.1.8 Test schedule	9
5.2 Reproducibility	10
5.2.1 Object of the test	10
5.2.2 Test procedure	10
5.2.3 Requirements	10
5.3 Rated impedance	10
5.3.1 Object of the test	10
5.3.2 Test procedure	11
5.3.3 Requirements	11
5.4 Horizontal and vertical coverage angles	11
5.4.1 Object of the test	11
5.4.2 Test procedure	12
5.4.3 Requirements	12
5.5 Maximum sound pressure level	12
5.5.1 Object of the test	12
5.5.2 Test procedure	13
5.5.3 Requirements	13
5.6 Rated noise power (durability)	13
5.6.1 Object of the test	13
5.6.2 Test procedure	13
5.6.3 Requirements	14
5.7 Dry heat (operational)	14
5.7.1 Object of the test	14
5.7.2 Test procedure	14
5.7.3 Requirements	15

5.8	Dry heat (endurance).....	15
5.8.1	Object of the test.....	15
5.8.2	Test procedure.....	15
5.8.3	Requirements.....	15
5.9	Cold (operational).....	16
5.9.1	Object of the test.....	16
5.9.2	Test procedure.....	16
5.9.3	Requirements.....	16
5.10	Damp heat, cyclic (operational).....	16
5.10.1	Object of the test.....	16
5.10.2	Test procedure.....	17
5.10.3	Requirements.....	17
5.11	Damp heat, steady-state (endurance).....	17
5.11.1	Object of the test.....	17
5.11.2	Test procedure.....	18
5.11.3	Requirements.....	18
5.12	Damp heat, cyclic (endurance).....	18
5.12.1	Object of the test.....	18
5.12.2	Test procedure.....	18
5.12.3	Requirements.....	19
5.13	Sulfur dioxide (SO ₂) corrosion (endurance).....	19
5.13.1	Object of the test.....	19
5.13.2	Test procedure.....	19
5.13.3	Requirements.....	20
5.14	Shock (operational).....	20
5.14.1	Object of the test.....	20
5.14.2	Test procedure.....	20
5.14.3	Requirements.....	20
5.15	Impact (operational).....	21
5.15.1	Object of the test.....	21
5.15.2	Test procedure.....	21
5.15.3	Requirements.....	21
5.16	Vibration, sinusoidal (operational).....	21
5.16.1	Object of the test.....	21
5.16.2	Test procedure.....	22
5.16.3	Requirements.....	22
5.17	Vibration, sinusoidal (endurance).....	23
5.17.1	Object of the test.....	23
5.17.2	Test procedure.....	23
5.17.3	Requirements.....	24
5.18	Ingress protection.....	24
5.18.1	Object of the test.....	24
5.18.2	Enclosure of the loudspeaker.....	24
5.18.3	Test procedure.....	24
5.18.4	Requirements.....	25
6	Test report.....	25
7	Marking.....	25
8	Data.....	26
Annex A	(normative) Acoustical measurements.....	27
Annex B	(normative) Measuring rated noise power (durability).....	32
Annex C	(informative) Loudspeaker physical references.....	37
Bibliography		39

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 3, *Fire detection and alarm systems*.

This second edition cancels and replaces the first edition (ISO 7240-24:2010), of which it constitutes a minor revision.

It also incorporates the Amendment ISO 7240-24:2010/Amd. 1:2013.

ISO 7240 consists of the following parts, under the general title *Fire detection and fire alarm systems*:

- *Part 1: General and definitions*
- *Part 2: Control and indicating equipment*
- *Part 3: Audible alarm devices*
- *Part 4: Power supply equipment*
- *Part 5: Point-type heat detectors*
- *Part 6: Carbon monoxide fire detectors using electro-chemical cells*
- *Part 7: Point-type smoke detectors using scattered light, transmitted light or ionization*
- *Part 8: Point-type fire detectors using a carbon monoxide sensor in combination with a heat sensor*
- *Part 9: Test fires for fire detectors [Technical Specification]*
- *Part 10: Point-type flame detectors*
- *Part 11: Manual call points*
- *Part 12: Line type smoke detectors using a transmitted optical beam*
- *Part 13: Compatibility assessment of system components*

- *Part 14: Design, installation, commissioning and service of fire detection and fire alarm systems in and around buildings*
- *Part 15: Point-type fire detectors using smoke and heat sensors*
- *Part 16: Sound system control and indicating equipment*
- *Part 17: Short-circuit isolators*
- *Part 18: Input/output devices*
- *Part 19: Design, installation, commissioning and service of sound systems for emergency purposes*
- *Part 20: Aspirating smoke detectors*
- *Part 21: Routing equipment*
- *Part 22: Smoke-detection equipment for ducts*
- *Part 23: Visual alarm devices*
- *Part 24: Fire alarm loudspeakers*
- *Part 25: Components using radio transmission paths*
- *Part 27: Point-type fire detectors using a scattered-light, transmitted-light or ionization smoke sensor, an electrochemical-cell carbon-monoxide sensor and a heat sensor*
- *Part 28: Fire protection control equipment*

The following part is under preparation:

- *Part 29: Video fire detectors*

Introduction

The purpose of a fire alarm loudspeaker as a component of a fire alarm system (see ISO 7240-19) is to provide intelligible warning to people in or within the vicinity of a building in which a fire emergency has occurred and to enable such person(s) to take appropriate measures in accordance with a predetermined evacuation plan.

The primary reason for using a fire alarm system, instead of coded warnings given by aural alarm indicators (see ISO 7240-3), is to reduce the time taken for those at risk to recognize that an emergency exists and to give clear instructions about what to do next. This means that fire alarm loudspeakers are required to achieve a minimum acoustical performance, as well as constructional and environmental requirements, to be suitable for use in a fire alarm system.

This part of ISO 7240 recognizes that the exact nature of the acoustical requirements for fire alarm loudspeakers varies according to the nature of the space into which they are installed. It therefore specifies the minimum requirements that apply to fire alarm loudspeakers and a common method for testing their operational performance against parameters specified by the manufacturers.

This part of ISO 7240 gives common requirements for the construction and robustness of fire alarm loudspeakers as well as their performance under climatic and mechanical conditions that are likely to occur in the service environment. As the types of loudspeaker considered in this part of ISO 7240 are passive electromechanical devices not involving sensitive electronic circuits, electromagnetic compatibility (EMC) tests have not been included. The loudspeakers have been classified for either an indoor or an outdoor application environment category.

This part of ISO 7240 requires that manufacturers specify certain characteristics in a consistent manner so that designers can make objective decisions about which loudspeaker to use in specific applications.

NOTES

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Fire detection and alarm systems

Part 24: Fire alarm loudspeakers

1 Scope

This part of ISO 7240 specifies requirements, test methods and performance criteria for loudspeakers intended to broadcast a warning of fire between a fire detection and alarm system and the occupants of a building (see ISO 7240-1:2014, Figure 1, item C).

This part of ISO 7240 specifies loudspeakers for two types of application environment: type A, generally for indoor use, and type B, generally for outdoor use.

This part of ISO 7240 does not cover loudspeakers for special applications, for example, loudspeakers for use in hazardous applications, if such applications require additional or other requirements or tests other than those given in this part of ISO 7240.

This part of ISO 7240 is not intended to cover addressable loudspeakers or loudspeakers with active components.

Audible alarm indicators are covered in ISO 7240-3.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7240-1, *Fire detection and alarm systems — Part 1: General and definitions*

IEC 60068-1, *Environmental testing — Part 1: General and guidance*

IEC 60068-2-1, *Environmental testing — Part 2-1: Tests — Test A: Cold*

IEC 60068-2-2, *Environmental testing — Part 2-2: Tests — Test B: Dry heat*

IEC 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

IEC 60068-2-30, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-42, *Environmental testing — Part 2-42: Tests — Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-75, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests*

IEC 60068-2-78, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

IEC 60268-1, *Sound system equipment — Part 1: General*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*

IEC 60695-11-10, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods*

IEC 60695-11-20, *Fire hazard testing — Part 11-20: Test flames — 500 W flame test methods*

IEC 61260, *Electroacoustics — Octave-band and fractional-octave-band filters*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms, definitions and symbols given in ISO 7240-1 and the following apply.

3.1 Terms and definitions

3.1.1

1/3 octave

frequency band as defined in IEC 61260

3.1.2

coverage angle

smallest angle between two directions on either side of the reference axis at which the sound pressure level is 6 dB less than the sound pressure level on the reference axis

Note 1 to entry: This angle is measured in the vertical and horizontal planes.

3.1.3

free-field condition

acoustical environment in which the sound pressure decreases with the distance, r , from a point source according to a $1/r$ law, with an accuracy of $\pm 10\%$, in the region that is occupied by the sound field between the loudspeaker system and the microphone during the measurements

EXAMPLE An anechoic room, a quiet outdoor space.

3.1.4

frequency response

sound pressure level at a distance of 4 m from the reference point on the reference axis, produced at 1/3 octave frequency bands, from 100 Hz to 10 kHz (centre frequencies)

Note 1 to entry: This is also referred to as magnitude or amplitude response.

3.1.5

ground plane measurement

measurement under half-space free-field conditions used to simulate a free-field condition in which the loudspeaker is mounted above an acoustically totally reflective boundary surface and aimed so that its reference axis points towards a measurement microphone that is placed directly on the boundary surface

Note 1 to entry: In order to achieve measurement results that are comparable with a free-field condition, ground-plane measurements need to be corrected by -6 dB at all frequencies.

3.1.6

half-space free-field condition

acoustical environment that is confined by a plane of sufficient size and in which the free-field exists in a hemisphere, so that the sound pressure from a point source mounted in the surface of that plane decreases in the manner defined in the free-field condition

EXAMPLE A half-space anechoic room.

3.1.7**horizontal plane**

virtual plane of the loudspeaker containing the reference axis, as specified by the manufacturer

Note 1 to entry: There may be several horizontal planes corresponding to several reference axes.

EXAMPLE See [Annex C](#).

3.1.8**loudspeaker enclosure**

any parts of the outer physical envelope of the loudspeaker that prevents or restricts access of solid foreign objects to the sound transducer, internal components and cable termination block

3.1.9**maximum sound pressure level**

total sound pressure level at 4 m from the reference point on the reference axis of a loudspeaker supplied with a simulated program signal at the rated noise power

3.1.10**measuring distance**

distance between the reference point and the measuring microphone

3.1.11**pink noise**

random noise signal with a spectral density that decreases by 3 dB per octave, giving constant energy per octave

3.1.12**rated impedance**

value of pure resistance, stated by the manufacturer, that is substituted for the loudspeaker when defining the required power of the source

3.1.13**rated noise power**

electrical power calculated from the formula U_n^2/R , where U_n is the rated noise voltage and R is the rated impedance

Note 1 to entry: For transformer-coupled loudspeakers, the rated noise power is the highest power setting specified by the manufacturer.

Note 2 to entry: The rated noise power is also called power-handling capacity.

3.1.14**rated noise voltage**

RMS voltage, as specified by the manufacturer, of the simulated program signal that the loudspeaker can sustain without thermal or mechanical damage

Note 1 to entry: See [Annex B](#).

Note 2 to entry: For transformer-coupled loudspeakers, the rated noise voltage typically equals 50 V, 70 V or 100 V.

3.1.15**reference axis**

virtual axis of the loudspeaker as specified by the manufacturer

Note 1 to entry: There may be several reference axes.

EXAMPLE See [Annex C](#).

3.1.16**reference plane**

virtual plane perpendicular to the reference axis as specified by the manufacturer

EXAMPLE See [Annex C](#).

3.1.17**reference point**

point at the intersection of the reference plane and the reference axis

EXAMPLE See [Annex C](#).

3.1.18**sensitivity**

sound pressure level, S , of a loudspeaker supplied with a 1 W pink noise signal from 100 Hz to 10 kHz measured at a distance of 4 m from the reference point on the reference axis

3.1.19**simulated program signal**

signal whose mean power spectral density closely resembles the average of the mean power spectral densities of a wide range of audio signals

EXAMPLE See [Annex B](#).

3.1.20**type A loudspeaker**

loudspeaker that is primarily intended for indoor applications

Note 1 to entry: Type A loudspeakers may be suitable for some protected outdoor situations.

3.1.21**type B loudspeaker**

loudspeaker that is primarily intended for outdoor applications

Note 1 to entry: Type B loudspeakers may be more suitable than type A for some indoor situations where high temperature or humidity is present.

3.1.22**vertical plane**

virtual plane of the loudspeaker perpendicular to the horizontal plane and containing the reference axis

EXAMPLE See [Annex C](#).

3.2 Abbreviated terms

DC direct current

RMS root mean square

4 Requirements

4.1 Compliance

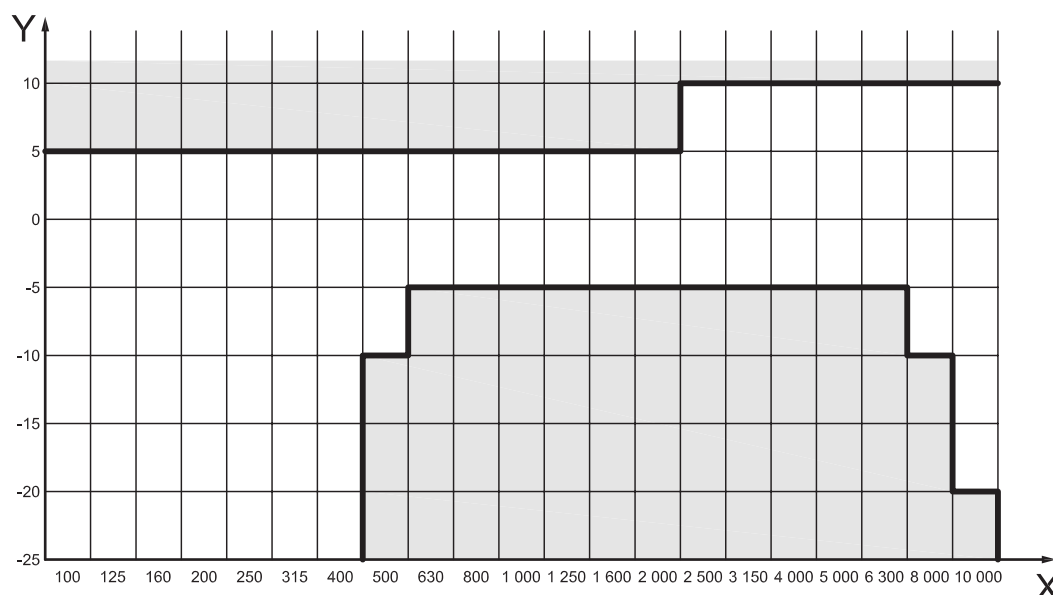
In order to conform to this part of ISO 7240, loudspeakers shall:

- meet the requirements of [Clause 4](#), which shall be verified by visual inspection or engineering assessment;
- be tested as specified in [Clause 5](#), and shall meet the requirements of the tests;
- meet the requirements of [Clauses 7](#) and [8](#), which shall be verified by visual inspection.

4.2 Frequency response limits

The loudspeaker frequency response shall fit within the unshaded area shown in [Figure 1](#).

NOTE If the frequency response shown in [Figure 1](#) can be achieved only by means of a frequency equalizer that is specified by the manufacturer for normal use [see [Clause 8 h](#)]), it is acceptable to insert a dedicated equalizer in the measurement setup (see [5.1.6](#)).



Key

- X 1/3 octave band centre frequency, expressed in hertz
 Y relative level, expressed in decibels

Figure 1 — Frequency response limit

4.3 Durability

The loudspeaker shall be rated for at least 100 h operation at the rated noise power specified by the manufacturer (refer to the test procedure described in [5.6](#)).

4.4 Construction

4.4.1 Provision for external conductors

4.4.1.1 The loudspeaker shall provide space within its enclosure for entry and termination of external conductors. Entry holes for conductors or cables shall be provided or the location where such holes can be made shall be indicated by providing a template or some other suitable means.

4.4.1.2 Terminals for connecting external conductors shall be designed so that they are clamped between metal surfaces without being damaged.

4.4.2 Materials

The loudspeaker shall be constructed of material(s) capable of withstanding the tests specified in [Clause 5](#). In addition, the material(s) of plastic enclosures shall conform to the following flammability requirements:

- a) IEC 60695-11-10 Class V-2 or HB75 for devices operating from a voltage source less than or equal to 30 V RMS or 42,4 V DC and dissipating less than 15 W;
- b) IEC 60695-11-20 Class 5VB for devices operating from a voltage source greater than 30 V RMS or 42,4 V DC and dissipating more than 15 W.

4.4.3 Ingress protection

The degree of protection provided by the enclosure of loudspeakers shall conform to the following requirements:

- for type A, indoor applications: Code IP21C of IEC 60529;
- for type B, outdoor applications: Code IP33C of IEC 60529.

4.4.4 Access

Means shall be provided to limit access for removal of parts of or the whole device and to make adjustment to the mode of operation, e.g. special tool, codes, hidden screws, seals.

5 Tests

5.1 General

5.1.1 Atmospheric conditions for tests

5.1.1.1 Unless otherwise stated in a test procedure, carry out the testing after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing described in IEC 60068-1 as follows:

temperature:	(15 to 35) °C;
relative humidity:	(25 to 75) %;
air pressure:	(86 to 106) kPa.

5.1.1.2 The temperature and humidity shall be substantially constant for each environmental test where the standard atmospheric conditions are applied.