
**Fire detection and alarm systems —
Part 3:
Audible alarm devices**

*Systèmes de détection et d'alarme d'incendie —
Partie 3: Dispositifs d'alarme sonores*

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

ISO 7240-3:2010

<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 7240-3:2010

<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2010

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	vi
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviated terms	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	3
4 Requirements.....	3
4.1 Compliance	3
4.2 Sound pressure level	3
4.3 Frequency and sound pattern.....	4
4.4 Audible alarm devices (a.a.d.s) with voice	4
4.5 Synchronization — Optional function	4
4.6 Construction	5
4.7 On-site adjustment of the mode of operation.....	5
4.8 Durability	6
4.9 Marking and data	6
4.10 Requirements for software-controlled a.a.d.s	7
5 Tests	8
5.1 General	8
5.2 Reproducibility	11
5.3 Operational performance	11
5.4 Durability	12
5.5 Dry heat (operational)	12
5.6 Dry heat (endurance).....	13
5.7 Cold (operational).....	14
5.8 Damp heat, cyclic (operational)	15
5.9 Damp heat, steady state (endurance).....	16
5.10 Damp heat, cyclic (endurance)	16
5.11 Sulfur dioxide (SO ₂) corrosion (endurance).....	17
5.12 Shock (operational).....	18
5.13 Impact (operational)	19
5.14 Vibration, sinusoidal (operational)	20
5.15 Vibration, sinusoidal (endurance)	21
5.16 Electromagnetic compatibility (EMC), immunity (operational).....	21
5.17 Enclosure protection.....	23
5.18 Operational performance for a.a.d.s with voice	24
5.19 Sequence timing for a.a.d.s with voice	24
5.20 Synchronization (optional)	25
6 Test report.....	26
Annex A (normative) Sound pressure level test for a.a.d.....	28
Annex B (normative) Comparative sound pressure level test during environmental conditioning	32
Annex C (informative) Comparison of flammability test requirements in various standards	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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 7240-3 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 3, *Fire detection and alarm systems*.

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

- iTeh STANDARD PREVIEW**
(standards.iteh.ai)
- *Part 1: General and definitions*
 - *Part 2: Control and indicating equipment* [ISO 7240-3:2010](https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010)
 - *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: Carbon monoxide fire detectors using an electro-chemical cell 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: Guidelines for drafting codes of practice for design, installation and use of fire detection and fire alarm systems in and around buildings* (Technical Report)

- Part 15: Point type fire detectors using scattered light, transmitted light or ionization sensors in combination with a heat sensor
- 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 devices¹⁾
- Part 24: Sound-system 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

ISO 7240-3:2010
<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010>

1) To be published.

Introduction

In a fire detection and alarm system, the purpose of the audible alarm devices is to warn person(s) within, or in the vicinity of, a building of the occurrence of a fire emergency situation in order to enable such a person(s) to take appropriate measures.

Audible alarm devices using voice messages are also for warning the occupants of a building of the occurrence of a fire risk. These use a combination of an attention-drawing signal and dedicated voice message(s). Additional requirements, test methods and performance criteria specific to audible alarm devices with voice are also incorporated in this International Standard.

Attention is drawn to ISO 8201, which specifies the temporal pattern and the required sound pressure level of an audible emergency evacuation signal.

This part of ISO 7240 recognizes that the exact nature of the sound requirements, i.e. its frequency range, temporal pattern and output level, will vary according to the nature of the installation, the type of risk present and appropriate measures to be taken, the type of signals used by other non-emergency alarms (see for example ISO 7731) and national differences in custom and practice. The resulting standard specifies, therefore, a common method for testing of the operational performance of audible alarm devices against the specification declared by the manufacturer, rather than imposing common requirements.

This part of ISO 7240 gives common requirements for the construction and robustness of audible alarm devices, as well as for their performance under climatic, mechanical and electrical interference conditions which are likely to occur in the service environment. Audible alarm devices have been classified in either an indoor or an outdoor application environment category.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010>

Fire detection and alarm systems —

Part 3: Audible alarm devices

1 Scope

This part of ISO 7240 specifies the requirements, test methods and performance criteria for audible alarm devices intended to signal an audible warning of fire between a detection and alarm system and the occupants of a building. It is intended to cover only those devices which derive their operating power by means of a physical electrical connection to an external source such as a fire alarm system.

This part of ISO 7240 is also intended to cover audible alarm devices capable of giving voice messages by the application of specific requirements, tests and performance criteria.

This part of ISO 7240 specifies fire alarm audible alarm devices for two types of application environment, type A for indoor use and type B for outdoor use.

This part of ISO 7240 is not intended to cover:

- a) loudspeaker-type devices primarily intended for emitting emergency voice messages that are generated from an external audio source;
- b) supervisory audible alarm devices, e.g. within the control and indicating equipment.

2 Normative references

The following referenced documents are indispensable for the application of this document. 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*

ISO 8201, *Acoustics — Audible emergency evacuation signal*

IEC 60068-1:1988/Corr. 1:1988/A1:1992, *Environmental testing — Part 1: General and guidance*

IEC 60068-2-1:2007, *Environmental testing — Part 2-1: Tests — Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing — Part 2-2: Tests — Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27:2008, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock*

IEC 60068-2-30:2005, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-42:2003, *Environmental testing — Part 2-42: Tests — Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60068-2-75:1997, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests*

IEC 60068-2-78:2001, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state*

IEC 60529:2001/Corr. 1:2003/Corr. 2:2007, *Degrees of protection provided by enclosures (IP code)*

IEC 60695-11-10:2003, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods*

IEC 60695-11-20:2003, *Fire hazard testing — Part 11-20: Test flames — 500 W flame test methods*

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

EN 50130-4:1995/A1:1998/A2:2003, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

3 Terms, definitions and abbreviated terms

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

3.1 Terms and definitions

3.1.1

A-weighted sound pressure level

sound pressure, which is 20 times the logarithm to base ten of the ratio of the A-weighted sound pressure to the reference pressure of 20 μ Pa at 1 kHz

NOTE The A-weighting characteristics are given in IEC 61672-1.

3.1.2

audible alarm device

a.a.d.

device intended to signal an audible warning of fire between a fire detection and alarm system and the occupants of a building

NOTE Audible alarm devices are sometimes referred to as “fire alarm sounders”.

3.1.3

mode (of operation)

one of a possible number of predefined sounds of the audible alarm device which can be selected by means specified by the manufacturer

EXAMPLE Sound patterns, sound pressure levels.

3.1.4

reference point

point representing the origin of the sound within or on the surface of the audible alarm device as specified by the manufacturer

NOTE The reference point is used in Annex A.

3.1.5**sound pattern**

predefined acoustic alarm signal

NOTE Sound pattern is also often referred to as “tone”.

3.1.6**supervisory sounder**

audible device on a piece of equipment used for drawing attention to a change of status

NOTE Supervisory sounders are often mounted within the fire detection and fire alarm control and indicating equipment.

3.1.7**type A a.a.d.**

device primarily intended for indoor applications

NOTE Type A a.a.d. may be suitable for some protected outdoor situations.

3.1.8**type B a.a.d.**

device primarily intended for outdoor applications

NOTE Type B a.a.d. may be more suitable than type A a.a.d. for some indoor situations where high temperature or humidity or both are present.

3.1.9**volume control**

means for adjusting sound pressure level

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.2 Abbreviated terms

<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-48b1-8503-0ec4c767bdd5/iso-7240-3-2010>

a.a.d. audible alarm device

AC alternating current

DC direct current

RMS root mean square

4 Requirements**4.1 Compliance**

In order to comply with this part of ISO 7240, an a.a.d. shall meet the requirements of this clause which shall be verified by visual inspection or engineering assessment, shall be tested as described in Clause 5 and shall meet the requirements of the tests.

4.2 Sound pressure level

This part of ISO 7240 requires that the manufacturer declare sound pressure levels in the data required by 4.9.2. The manufacturer may declare different sound pressure levels for operation under different conditions, e.g. when operating on different voltage ranges or with different sound patterns. If this is the case, the sound pressure level of each specimen shall be measured under each mode of operation (see 5.3).

When tested in accordance with 5.3, the a.a.d. shall produce A-weighted sound pressure levels of not less than 65 dB in one direction at a distance of 1 m.

NOTE A maximum sound pressure level received by occupants can be specified by national regulations.

4.3 Frequency and sound pattern

This part of ISO 7240 covers a.a.d.s which produce different frequencies and sound patterns and, therefore, does not specify a minimum and maximum frequency or specific sound pattern. However, the main sound frequency(ies), frequency range(s) and sound pattern(s) shall be declared in the data required in 4.9.2.

NOTE The sound patterns and frequencies required can vary in different countries. Reference needs to be made to local regulations. ISO 8201 specifies a standard international evacuation signal.

4.4 Audible alarm devices (a.a.d.s) with voice

4.4.1 A.a.d.s using voice messages shall be capable of producing an audible warning signal and a voice message or messages.

4.4.2 Representative messages related to fire safety shall be declared by the manufacturer and shall be considered by the testing authority. The message determined to be worst case shall be subject to conformance assessment.

When selecting the worst-case message, message length, loudness and repetition timing should be considered.

4.4.3 For messages that require immediate action, the warning signal and message sequence broadcast by the device shall be within the following limits:

- a) warning signal, lasting for 2 s to 10 s; followed by
- b) silence, lasting for 0,25 s to 2 s; followed by
- c) voice message; followed by
- d) silence, lasting for 0,25 s to 5 s.

The time for each cycle shall not exceed 30 s.

The periods of silence may need to be longer than indicated in certain circumstances, for example in spaces with long reverberation times, but shall not be such that the time between the start of each cycle exceeds 30 s.

For other messages, it is permitted to extend either or both the silence period after the voice message and the period within which the message is repeated.

4.4.4 Access to the message recording function shall be restricted as specified in 4.6.4.

Persons trained in the proper use of microphones should be used to recording the messages. The recordings should be made in a room with a controlled acoustic environment having an ambient A-weighted noise level not greater than 30 dB and a reverberation time not greater than 0,5 s from 150 Hz to 10 kHz.

4.5 Synchronization — Optional function

To prevent acoustic interaction of a.a.d.s installed in close proximity, a.a.d.s shall have provision for synchronizing warning signals and messages with that of other devices. Synchronization shall meet the requirements of 5.20.4.

Power interruption used for synchronization purposes shall not adversely affect the warning signal or the voice message.

NOTE Synchronization can be achieved by internal circuitry, the addition of a trigger wire connected between devices or by other means as defined by the manufacturer.

4.6 Construction

4.6.1 Provision for external conductors

4.6.1.1 The a.a.d. 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.

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

4.6.2 Materials

The a.a.d. shall be constructed of material(s) capable of withstanding the tests described in 5.2 to 5.17. In addition, the material(s) of plastic enclosures shall meet 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 consuming less than 15 W of power;
- 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 consuming more than 15 W of power.

NOTE Verification of conformance to 4.6.2 a) and 4.6.2 b) can be carried out by examination of a certificate of conformity or equivalent (see Annex C).

4.6.3 Ingress protection

The degree of protection provided by the enclosure of the a.a.d. shall meet or exceed the following requirements:

- a) type A – IP21C of IEC 60529.
- b) type B – IP33C of IEC 60529.

4.6.4 Access

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

NOTE The use of a special tool is intended to discourage unauthorized persons from easily accessing the equipment.

4.7 On-site adjustment of the mode of operation

If there is provision for on-site adjustment of the mode of operation of the a.a.d.:

- a) for each setting at which the manufacturer claims compliance with this part of ISO 7240, the a.a.d. shall comply with 4.6.4;
- b) any setting(s) at which the manufacturer does not claim compliance with this part of ISO 7240, shall comply with 4.6.4 and:
 - 1) for volume controls, the limits of the compliant range of sound pressure levels shall be clearly marked on the a.a.d. and shown in the associated data,
 - 2) for sound pattern, the compliant setting(s) shall be clearly marked in the associated data.

NOTE These adjustments can be carried out at the a.a.d. or at the control and indicating equipment.

4.8 Durability

The a.a.d. shall be rated for at least 100 h of operation. No limitation by the manufacturer on duty factor or maximum on-time shall prevent the device from operating the 1 h “on” 1 h “off” cycle required by the test procedure described in 5.4.

This requirement does not apply to the capacity of batteries which may be used within a.a.d.s as a means of local storage of operating power. The capacity and charging requirements of such batteries need to meet the requirements of the system.

4.9 Marking and data

4.9.1 Marking

Each a.a.d. shall be clearly marked with the following information:

- a) number of this part of ISO 7240 (i.e. ISO 7240-3:2010);
- b) environmental type, [i.e. type A or type B (see Clause 3)];
- c) name or trademark of the manufacturer or supplier;
- d) manufacturer or supplier model designation (type or number);
- e) terminal designations;
- f) rated supply voltages or voltage ranges (AC or DC);
- g) mark(s) or code(s) (for example, serial number or batch code) by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software contained within the device.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 7240-3:2010
<https://standards.iteh.ai/catalog/standards/sist/1a3b6f96-c776-4861-8503-0ec4c767bdd5/iso-7240-3-2010>

Where any marking on the device uses symbols or abbreviations not in common use then these shall be explained in the data supplied with the device.

The marking need not be discernible when the device is installed and ready for use but shall be visible during installation and shall be accessible during maintenance.

The markings shall not be placed on screws or other easily removable parts.

4.9.2 Data

The information required in 4.9.1, together with the following, shall be supplied with the device, or shall be given in a data sheet or technical manual identified on, or with each device:

- a) operating voltage range(s);
- b) maximum or average current consumption, where applicable;

For a.a.d.s used in an addressable system, it may not be relevant to declare the current consumption as system configuration and the loading of addressable circuit(s) is configured at the control and indicating equipment.

- c) for all specified modes of operation for which compliance with this part of ISO 7240 is claimed, the minimum A-weighted sound pressure level in dB at a distance of 1 m from the reference point of the device for the following directions of radiation:

- 1) surface-mounted device: at 30° intervals from 15° to 165° through a semi-circular arc in front of the device and centered at the intersection of its normal mounting surface and its principal axis, for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Annex A, Figure A.2),
 - 2) pole-mounted device: at 30° intervals through a 360° circle centered at the intersection of the horizontal plane containing its principal axis and the vertical line through the geometric centre of the sound diffusing assembly, for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Annex A, Figure A.3);
- d) sound pattern(s) that comply with this part of ISO 7240 and, where applicable, sound pattern(s) that comply with national standards;
- e) IP code to IEC 60529;
- f) any other information necessary to allow correct installation, operation and maintenance of the device.

4.10 Requirements for software-controlled a.a.d.s

4.10.1 General

For a.a.d.s which rely on software control in order to fulfil the requirements of this part of ISO 7240, the requirements of 4.10.2, 4.10.3 and 4.10.4 shall be met.

4.10.2 Software documentation

4.10.2.1 The manufacturer shall submit documentation which gives an overview of the software design. This documentation shall be in sufficient detail for the design to be inspected for compliance with this part of ISO 7240 and shall include at least the following:

- a) a functional description of the main program flow (e.g. as a flow diagram or structogram), including a brief description of the following:
 - 1) the modules and the functions that they perform,
 - 2) the way in which the modules interact,
 - 3) the overall hierarchy of the program,
 - 4) the way in which the software interacts with the hardware of the a.a.d.,
 - 5) the way in which the modules are called, including any interrupt processing;
- b) a description of which areas of memory are used for the various purposes (e.g. the program, site-specific data and running data);
- c) a designation by which the software and its version can be uniquely identified.

4.10.2.2 The manufacturer shall prepare and maintain detailed design documentation. This shall be available for inspection in a manner that respects the manufacturers' rights for confidentiality. It shall comprise at least the following:

- a) an overview of the whole system configuration, including all software and hardware components;
- b) a description of each module of the program, containing at least:
 - 1) the name of the module,