
**Fire detection and alarm systems —
Part 16:
Sound system control and indicating
equipment**

Systèmes de détection et d'alarme d'incendie —

*Partie 16: Équipement de contrôle et de signalisation des systèmes
sonores*

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Published in Switzerland

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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 7240-16 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 3, *Fire detection and alarm systems*.

This first edition of ISO 7240-16 together with ISO 7240-19 cancels and replaces IEC 60849:1998, which has been technically revised.

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

- *Part 1: General and definitions*
- *Part 2: Control and indicating equipment*
- *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 19: Design, installation, commissioning and service of sound systems for emergency purposes*
- *Part 21: Routing equipment*
- *Part 22: Smoke-detection equipment for ducts*
- *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*

A part 26 dealing with oil mist detectors and a part 28 dealing with fire protection control equipment are under development.

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Introduction

Sound system control and indicating equipment (s.s.c.i.e.) forms part of a sound system for emergency purposes (s.s.e.p.). An s.s.e.p. operates automatically or manually in a building or structure to alert occupants to a hazard which may require their evacuation in a safe and orderly manner. Equipment to warn occupants is therefore required to function after the hazard has been detected. Fire in a building is a common hazard which is often detected by an automatic fire detection and alarm system. An s.s.e.p. may operate as part of a fire detection and alarm system or may function in conjunction with other emergency detection systems, such as those for storms, earthquakes and bomb threats. The s.s.c.i.e. may be a separate unit or may be physically combined with the fire detection control and indicating equipment (see ISO 7240-2).

This part of ISO 7240 has been prepared by Subcommittee ISO/TC 21/SC 3 and is based on IEC 60849:1998, *Sound systems for emergency purposes*, prepared by the International Electrotechnical Commission IEC/TC 100, *Audio, video and multimedia systems and equipment*.

This part of ISO 7240 follows the format of, and has similar requirements to, ISO 7240-2 and is drafted on the basis of mandatory functions which are to be provided on all s.s.c.i.e. and optional functions (with requirements) which may be provided. Each optional function is included as a separate entity, with its own set of associated requirements, in order for s.s.c.i.e. with different combinations of functions to comply with this part of ISO 7240. It is intended that the options be used for specific applications, as recommended in ISO 7240-19 and the emergency management plan. Other functions associated with an s.s.e.p. may also be provided, even if they are not specified in this part of ISO 7240.

This part of ISO 7240 contains specific tests that subject the equipment to conditions likely to be met in practice, such as corrosion, vibration, direct impact, indirect shock and electromagnetic interference. Some tests specified are intended to assess the performance of the s.s.c.i.e. under such conditions. The performance of the s.s.c.i.e. is assessed from the results obtained in specific tests. This part of ISO 7240 is not intended to place any other restrictions on the design and construction of such equipment.

Fire detection and alarm systems —

Part 16:

Sound system control and indicating equipment

1 Scope

This part of ISO 7240 specifies the requirements, test methods and performance criteria for sound system control and indicating equipment (s.s.c.i.e.) for use in buildings and structures as part of a sound system for emergency purposes (s.s.e.p.) (item C of Figure 2 in ISO 7240-1:2005). The s.s.c.i.e. is primarily intended to broadcast information for the protection of lives within one or more specified areas in an emergency, to effect a rapid and orderly mobilization of occupants in an indoor or outdoor area. This includes systems using loudspeakers to broadcast voice announcements for emergency purposes, alert signals complying with ISO 7731, and evacuate signals complying with ISO 8201.

The overall requirements of an s.s.e.p., especially concerning audibility and intelligibility, are contained within ISO 7240-19. In addition to ensuring compliance with this part of ISO 7240, the manufacturer should also consider the requirements of ISO 7240-19, national regulations, codes and standards that affect the s.s.c.i.e. design and usability. For example, some regulations require certain optional functions to be available on all s.s.c.i.e. installed within the jurisdiction.

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The use of the equipment for normal sound reinforcement and distribution systems purposes under non-hazardous circumstances is not excluded.

This part of ISO 7240 can also be used for the assessment of similar control and indicating equipment for use in systems where the warning-signal broadcast does not include a voice message.

This part of ISO 7240 does not apply to systems using only sounders or bells.

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 7240-1:2005, *Fire detection and alarm systems — Part 1: General and definitions*

ISO 7240-2:2003, *Fire detection and alarm systems — Part 2: Control and indicating equipment*

ISO 7240-4:2003, *Fire detection and alarm systems — Part 4: Power supply equipment*

ISO 7240-5, *Fire detection and alarm systems — Part 5: Point-type heat detectors*

ISO 7240-6, *Fire detection and alarm systems — Part 6: Carbon monoxide fire detectors using electrochemical cells*

ISO 7240-7, *Fire detection and alarm systems — Part 7: Point-type smoke detectors using scattered light, transmitted light or ionization*

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ISO 7240-8, *Fire detection and alarm systems — Part 8: Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor*

ISO/TS 7240-9, *Fire detection and alarm systems — Part 9: Test fires for fire detectors*

ISO 7240-10, *Fire detection and alarm systems — Part 10: Point-type flame detectors*

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

ISO 7240-12, *Fire detection and alarm systems — Part 12: Line type smoke detectors using a transmitted optical beam*

ISO 7240-13, *Fire detection and alarm systems — Part 13: Compatibility assessment of system components*

ISO/TR 7240-14, *Fire detection and alarm systems — Part 14: Guidelines for drafting codes of practice for design, installation and use of fire detection and fire alarm systems in and around buildings*

ISO 7240-15, *Fire detection and alarm systems — Part 15: Point type fire detectors using scattered light, transmitted light or ionization sensors in combination with a heat sensor*

ISO 7240-19, *Fire detection and alarm systems — Part 19: Design, installation, commissioning and service of sound systems for emergency purposes*

ISO 7240-21, *Fire detection and alarm systems — Part 21: Routing equipment*

ISO 7240-22, *Fire detection and alarm systems — Part 22: Smoke detection equipment for ducts*

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

ISO 8201, *Acoustics — Audible emergency evacuation signal*

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

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

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

IEC 60068-2-47, *Environmental testing — Part 2-47: Test — Mounting of specimens for vibration, impact and similar dynamic tests*

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 60268-4:2004, *Sound system equipment — Part 4: Microphones*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP Code)*

IEC 60721-3-3:2002, *Classification of environmental conditions — Part 3-3: Classification of groups of environmental parameters and their severities — Stationary use at weather protected locations*

EN 50130-4, *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 and definitions given in ISO 7240-1 and the following apply. See also ISO 7240-1:2005, Figure 2.

3.1 Terms and definitions

3.1.1

automatic mode

mode of operation of a sound system which is linked to an emergency detection system, or other means of triggering the sound system, to broadcast emergency messages without human intervention in a manner which is pre-set according to an agreed emergency-response procedure unique to that building

3.1.2

cabinet

housing which affords a degree of protection and robustness to its constituent parts and subassemblies

3.1.3

emergency microphone

microphone dedicated for use by competent personnel during the voice-alarm condition

3.1.4

emergency microphone control

manual control which activates an emergency microphone (also called a “push-to-talk” control)

3.1.5

emergency loudspeaker zone

subdivision of the premises such that the occurrence of an emergency within it will be indicated separately from any other subdivision at the s.s.c.i.e. and broadcast separately within the subdivision

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3.1.6

functional condition

condition of the s.s.c.i.e. characterized by its indication at the s.s.c.i.e

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NOTE The functional conditions recognized in this part of ISO 7240 are

- the quiescent condition,
- the voice-alarm condition,
- the fault-warning condition,
- the disabled condition, and
- the test condition.

3.1.7

manual mode

mode of operation where an operator is directly in control of the broadcast of live or pre-recorded sounds, especially those of an emergency nature

3.1.8

quiescent condition

functional condition characterised by the absence of the voice-alarm, fault-warning, disabled and test conditions

3.1.9

transmission path

physical connection between s.s.e.p. components (external to the cabinet of the component) used for the transmission of information, including audio and/or power

3.1.10

voice-alarm condition

alert signal, evacuate signal, recorded or live emergency signal broadcast in at least one emergency loudspeaker zone

3.2 Abbreviations

- c.i.e. control and indicating equipment
- r.m.s. root mean squared
- S/N signal-to-noise ratio
- s.s.c.i.e. sound system control and indicating equipment
- s.s.e.p. sound system for emergency purposes
- THD total harmonic distortion

4 General requirements

4.1 General

4.1.1 If an optional function is included in the s.s.c.i.e., then all the corresponding requirements shall be met (see also Annex A).

4.1.2 If functions other than those specified in this part of ISO 7240 are provided, they shall not jeopardize compliance with any requirements of this part of ISO 7240-16:2007

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4.2 Combined s.s.c.i.e. and c.i.e.

When the s.s.c.i.e. and c.i.e. are in the same cabinet, they may share common indications, manual controls and outputs (see Annex B). In this case, the following shall apply.

- a) A single fault in the c.i.e. shall not adversely affect the mandatory functions of the s.s.c.i.e.
- b) Indication(s) and manual control(s) associated with the s.s.c.i.e. which are dedicated to the fault-warning function shall be clearly identifiable.

4.3 Power supply

Power-supply equipment shall comply with the requirements of ISO 7240-4 and may be internal or external to the s.s.c.i.e. cabinet.

The power supply may be shared with that of the emergency detection system.

5 General requirements for indications

5.1 Display of functional conditions

5.1.1 The s.s.c.i.e. shall be capable of unambiguously indicating the following functional conditions, as described in Clauses 6 to 10:

- quiescent condition;

- voice-alarm condition;
- fault-warning condition;
- disabled condition (optional function);
- test condition (optional function).

5.1.2 The s.s.c.i.e. shall be capable of being simultaneously, in any combination of the following functional conditions:

- one or more voice-alarm conditions;
- fault-warning condition;
- disablement condition;
- test condition.

5.2 Display of indications

All mandatory indications shall be clearly identifiable, except where otherwise specified in this part of ISO 7240.

5.3 Indications on alphanumeric displays

Where an alphanumeric display is used to display indications relating to different functional conditions, these may be displayed at the same time. However, for each functional condition, there shall be only one window in which all of the fields relating to that functional condition are grouped.

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5.4 Indication of the supply of power

5.4.1 A visible indication shall be given by means of a separate light-emitting indicator while the s.s.c.i.e. is supplied with power.

5.4.2 Where the s.s.c.i.e. is distributed in more than one cabinet, an indication of supply of power shall be given at each distributed cabinet.

5.5 Additional indications

Where indications are used in addition to mandatory indications, these shall not result in contradiction or confusion.

6 Quiescent condition

Any kind of system information may be displayed during the quiescent condition. However, no indications shall be given that can be confused with indications used in

- the voice-alarm condition,
- the fault-warning condition,
- the disabled condition, or
- the test condition.

7 Voice-alarm condition

7.1 Reception and processing of alarm signal

7.1.1 The s.s.c.i.e. shall be capable of receiving and processing voice-alarm condition signals from an emergency detection system (see Annex C) and/or manual controls, and causing the appropriate alarm and warning-signal outputs to be activated within 3 s, or after the expiry of any delay period (see 7.6).

7.1.2 The mandatory indications and/or outputs shall not be falsified by multiple signals received from the same or different emergency detection systems and/or manual controls.

7.1.3 Where the s.s.c.i.e. and the c.i.e. are in separate cabinets, failure of the transmission path between the emergency detection system and the s.s.c.i.e. shall not affect the operation of the s.s.c.i.e. or any change of state of the voice-alarm condition.

7.1.4 Where the s.s.c.i.e. is used for non-emergency purposes (e.g. paging, music or general pre-recorded announcements), the voice-alarm condition shall disable or override any functions not connected with the emergency functions.

7.2 Alert signal – Optional function

7.2.1 The s.s.c.i.e. may produce one or more alert signals complying with ISO 7731.

NOTE The alert signal can be used together with an emergency management plan (see ISO 7240-19) to alert occupants to a hazard and to prompt evacuation supervisors to attend control points and prepare for further instructions.

Different alert signals may be used to alert trained personnel to different hazards.

7.2.2 Where a voice signal is used as part of the alert signal, the alert signal shall precede the first pre-recorded voice message for 3 s to 10 s. Successive alert signals and messages shall then continue until either automatically or manually changed or silenced. The interval between successive messages shall not exceed 30 s and alert signals shall be broadcast whenever periods of silence might otherwise exceed 10 s.

7.2.3 Where more than one alert signal is provided, each signal shall be clearly distinguishable.

Where an alert signal is used as part of an automatic evacuation plan, it should precede the evacuate signal and may include voice messages.

7.3 Evacuate signal

7.3.1 The evacuate signal may be preceded by an alert signal (see 7.2).

The use of an alert signal, together with an evacuate signal, should be assessed as part of an emergency management plan (see ISO 7240-19). For buildings and structures where the plan requires the unassisted evacuation of occupants, the s.s.e.p. may be configured to generate a warning signal that does not incorporate an alert signal.

7.3.2 The evacuate signal shall include the tone signal and pre-recorded voice messages, as specified in ISO 8201.

Manufacturers may implement other signal templates to satisfy specific mandated national requirements.

7.4 Indication of the voice-alarm condition

The presence of a voice-alarm condition shall be indicated on the s.s.c.i.e., without prior manual intervention, by

- a) a visible indication by means of a separate discrete light-emitting indicator (the general voice-alarm-activated indicator);

- b) a visible indication for each activated emergency loudspeaker zone where manual controls are provided; this may be by means of separate discrete indicators or an alphanumeric display, as specified in 14.8;
- c) an optional audible indication, as specified in 7.5.

7.5 Audible warning – Optional function

7.5.1 An audible warning, at the s.s.c.i.e., of the voice-alarm condition may be the same as that for the fault-warning condition. If they are different, the voice-alarm condition warning shall have priority.

7.5.2 The audible warning shall be capable of being silenced at access level 1 or 2 (see Annex D for more information on access levels).

7.5.3 The audible warning shall be silenced automatically when the s.s.c.i.e. is reset from the voice-alarm condition.

7.6 Delay before entering the voice-alarm condition – Optional function

The s.s.c.i.e. may be provided with a facility to introduce a delay before entering the voice-alarm condition. In this case, the following shall apply.

- a) The configuration of delays shall be selectable at access level 3 (see Annex D for more information on access levels).
- b) The operation of the delay shall be in increments not exceeding 1 min, up to a maximum of 10 min.
- c) The delay to one output signal shall not affect the delay to other outputs.
- d) It shall be possible to override the delay by a manual operation at access level 1 and/or by a signal from a manual call point.
- e) There shall be a provision to switch on and switch off delays by means of a manual operation at access level 2.
- f) There may be a provision to automatically switch on and/or switch off delays by means of a programmable timer, which shall be configurable at access level 3.
- g) A separate light-emitting indicator and/or a field on the alphanumeric display shall be visible when an alarm signal is received and the delay is activated. This indication shall be suppressed after the s.s.c.i.e. enters the voice-alarm condition.

7.7 Phased evacuation – Optional function

The s.s.c.i.e. may be provided with a facility to delay the warning signals to the emergency loudspeaker zones (see 7.6). The following shall apply.

- a) The facility shall be configurable at access level 3 (see Annex D for more information on access levels).
- b) There may be a provision to switch between manual mode and a phased evacuation sequence by means of a manual operation at access level 2.
- c) When switching from phased evacuation to manual mode, the phased evacuation sequence shall halt.
- d) When switching from manual mode to phased evacuation, the phased evacuation sequence shall resume from the point at which it was halted.