
Fire detection and alarm systems —
Part 1:
General and definitions

Systèmes de détection et d'alarme d'incendie —
 Partie 1: Généralités et définitions

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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 7240-1 was prepared by Technical Committee 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 7240-1:1988), 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 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* [title changed from Multisensor detectors by ISO 7240-15:2004/Cor.1:2005]

- *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*

The following part is under preparation:

- *Part 8: Carbon monoxide fire detectors using an electro-chemical cell in combination with a heat sensor*

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Introduction

ISO 7240 (all parts) specifies components of fire detection and alarm systems, requirements for their interconnection and installation and the performance, testing and servicing of parts or of complete systems.

ISO 7240 (all parts) applies to fire detection and alarm systems for buildings. It can be used as a basis for the assessment of systems for other purposes, e.g. mines, ships. It does not preclude the manufacture or use of systems having special characteristics suitable for protection of specific risks against specific hazards.

A fire detection and alarm system is required to function satisfactorily not only in the event of fire, but also during and after exposure 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 system components under such conditions.

The performance of components of fire detection and alarm systems is assessed from the results obtained in the specific tests; ISO 7240 (all parts) is not intended to place any other restrictions on the design and construction of such components.

If appropriate, ISO 7240 (all parts) can be applied to the detection part of extinguishing systems, excluding sprinkler heads, although the sensitivity requirements might not be applicable in every instance.

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Fire detection and alarm systems —

Part 1: General and definitions

1 Scope

This part of ISO 7240 provides a set of general guidelines and definitions to be used in describing the fire detection and alarm system equipment, tests and requirements in the other parts of ISO 7240.

The components that a fire detection and alarm system can have are shown in Figure 1. Item C of Figure 1 can be replaced by a sound system for emergency purposes, the components of which are shown in Figure 2.

Fire detectors can be self-contained: these are devices containing within one housing all the components, except possibly the energy source, necessary for detection of fire and giving an audible alarm.

NOTE Inter-connected smoke alarms complying with ISO 12239 and not connected to control and indicating equipment do not form a fire detection and alarm system as defined in this part of ISO 7240.

2 General guidelines

2.1 The purpose of a fire detection and alarm system is to detect fire at the earliest practicable moment and to give an alarm so that the appropriate action can be taken (e.g. evacuation of occupants, summoning the firefighting service, triggering of extinguishing equipment, control of smoke doors, dampers and fans).

A fire alarm system may be activated by automatic detection devices or by manual operation.

2.2 The general principles given in 2.3 to 2.7 are guidelines to the design and construction of fire detection and alarm systems.

2.3 A fire detection and alarm system should

- detect quickly enough to fulfil its intended function;
- reliably transmit the detection signal to the control and indicating equipment and, if applicable, the fire alarm receiving station;
- translate this detection signal into a clear alarm signal that attracts the attention of the occupant in an immediate and unmistakable way;
- remain insensitive to phenomena other than those which its function is to detect;
- signal immediately and clearly any supervised fault that might jeopardize the correct performance of the system.

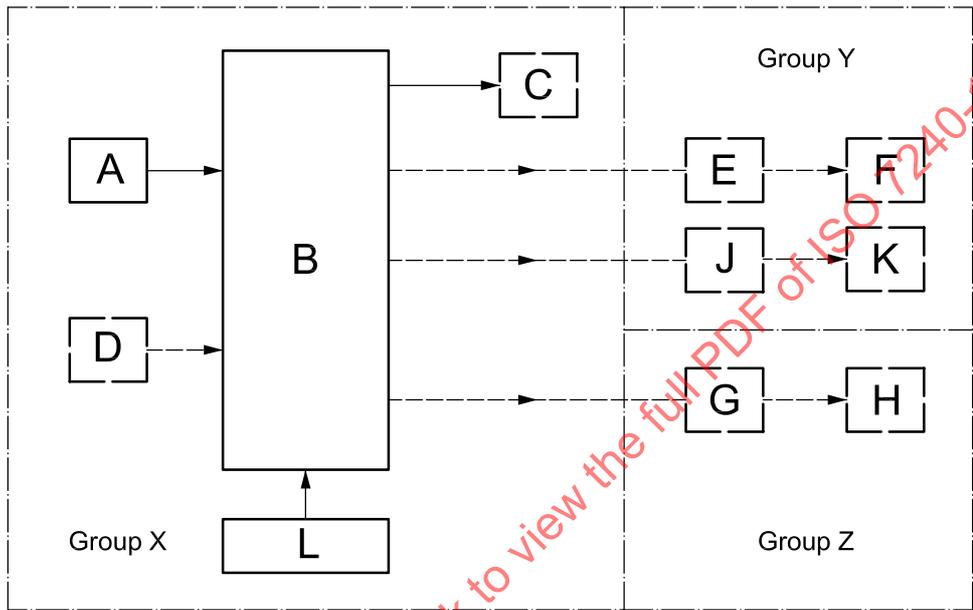
2.4 A fire detection and alarm system should not

- be adversely affected by any other systems whether associated with it or not;
- be rendered partially or totally inoperative by the fire or the phenomenon which it is designed to detect before the fire or phenomenon has been detected.

2.5 A fire detection and alarm system should be reliable. A system is reliable when it fulfils its intended functions without errors or omissions.

2.6 Compliance of components with ISO 7240 (all parts) does not necessarily ensure the compatibility of components with each other. Compatibility should be considered when designing a system. Requirements for the assessment of the compatibility of system components are specified in ISO 7240-13. Satisfactory operation of an installed system should be confirmed by testing after completion of the installation.

2.7 Any fault affecting a part of a fire detection and alarm system should not result in further faults in the system as a whole or indirect hazards outside the system.



Key

- | | |
|------------------------------------|---|
| A fire detector | G control for automatic fire protection equipment |
| B control and indicating equipment | H automatic fire protection equipment |
| C fire alarm signalling device | J fault warning routing equipment |
| D manual call point | K fault warning receiving station |
| E fire alarm routing equipment | L power supply |
| F fire alarm receiving station | |

NOTE Transmission and reception of fire alarm fault signals from protected premises may be provided over a common communication channel (i.e. items E and J, and F and K, may be combined).

The significance of the outlines is as follow:

————— equipment and connection elements that are always present in an automatic fire detection and alarm system

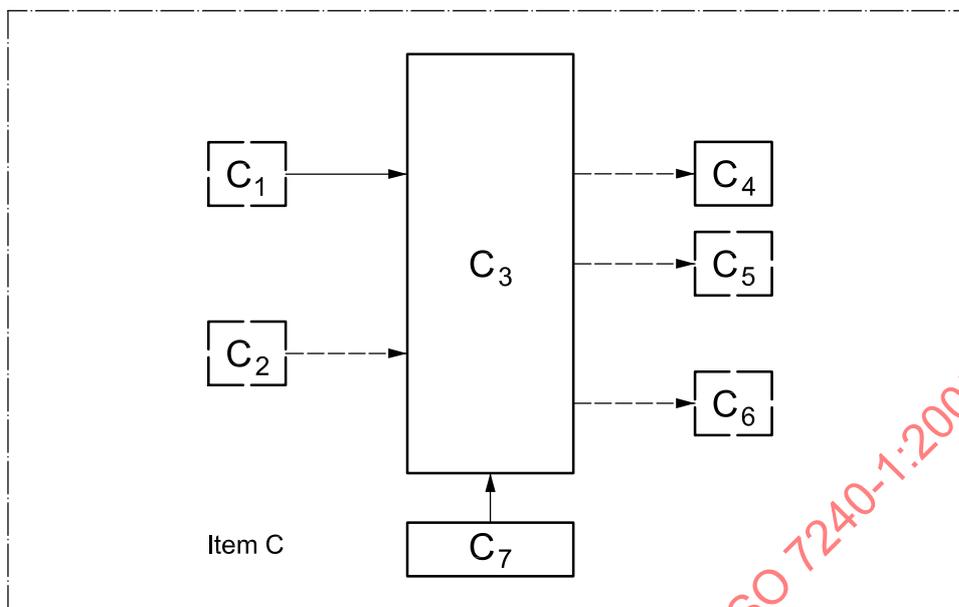
----- equipment and connection elements that may sometimes be present in an automatic fire detection and alarm system

Group X: Equipment required for local warning.

Group Y: Additional equipment required for external aid.

Group Z: Additional equipment required for local automatic fire protection equipment.

Figure 1 — Fire detection and alarm system

**Key**

- C₁ emergency detection system (e.g. fire detection system)
 C₂ manual call point
 C₃ sound system control and indicating equipment
 C₄ loudspeaker
 C₅ visual warning device
 C₆ tactile warning device
 C₇ power supply equipment (may be same as item L in Figure 1)

The significance of the outlines is as follow:

- equipment and connection elements that are always be present in a sound system for emergency purposes
 - - - - - equipment and connection elements that may sometimes be present in a sound system for emergency purposes

Figure 2 — Sound system for emergency purposes

3 Terms and definitions

For the purposes of this part of ISO 7240, the following terms and definitions apply.

3.1

absorbance index

cf. *m* (3.57)

3.2

access level

one of several states of a control and indicating equipment (see Figure 1, item B and Figure 2, item C₃) in which selected

- controls can be operated,
- manual operations can be carried out,

- indications are visible, and/or,
- information can be obtained.

**3.3
addressable point**

point that can be individually identified at the control and indicating equipment (see Figure 1, item B)

NOTE Compare **point** (3.73).

**3.4
aerosol density
smoke density**

amount of particulates per volume as described operationally by one of two parameters:

- m (3.57), an absorbance index, used in the testing of smoke alarms using scattered or transmitted light;
- y (3.110), a dimensionless variable, used in the testing of smoke alarms using ionization.

NOTE Note that these parameters are not concentrations *sensu stricto*, but represent values which are proportional to the concentration and have been shown to function in lieu of a true concentration value for the purposes of tests.

**3.5
alarm**

signal, or condition, warning of an emergency

**3.6
alarm indication**

indication (at the indicating equipment, see Figure 1, item B) to show that a detection signal has been received

**3.7
alert signal**

audible signal complying with ISO 7731 or visual signal or a combination of audible and visual signals that call attention to the possibility of a hazardous or dangerous situation

**3.8
alphanumeric display**

indicator capable of giving information by the display of messages consisting of text and/or numeric characters

**3.9
analogue detector**

detector which gives an output signal representing the value of a the sensed phenomenon

NOTE This may be a true analogue signal or a digitally encoded equivalent of the sensed value. This detector does not itself make a decision of fire alarm.

**3.10
automatic fire detection and alarm system**

system in which an alarm of fire can be initiated automatically

**3.11
automatic fire protection equipment**

fire control or firefighting equipment e.g. control of smoke doors, dampers, fans or an automatic extinguishing installation

See Figure 1, item H.

3.12**certification**

written confirmation that a certain work or service has been carried out, the result of which is a signed document (certificate) that may be counter-signed and can be used as testimony

3.13**combination detector**

detector combining two or more detecting principles in a single housing

3.14**configuration**

arrangement of components of a fire detection and alarm system specified by number, type and topology, together with any necessary limits on the connecting links

3.15**confirmation signal**

signal from a fire detector or manual call point which terminates a first alarm state

3.16**connection elements**

those elements which form the links between the components of a fire detection and alarm system (Figure 1)

3.17**control and indicating equipment**

equipment through which detectors can be supplied with power and which

- a) is used to accept a detection signal and to activate a fire alarm signal and which may also be required to indicate the location of the fire and to record any of this information;
- b) if required, is able to pass on the fire detection signal through fire alarm routing equipment (see Figure 1, item E) to, for example, the fire fighting service or, through the control for automatic fire protection equipment (see Figure 1, item G), to, for example an automatic extinguishing installation;
- c) is used to automatically supervise the correct function of the system and give audible and visible warning of specified faults.

See Figure 1, item B.

3.18**control for automatic fire protection equipment**

automatic device used to actuate automatic fire protection equipment (see Figure 1, item H) after receiving a signal from the control and indicating equipment

See Figure 1, item G.

3.19**documentation**

drawings and instructions necessary to understand and to operate the fire detection and alarm system

3.20**detachable detector**

detector designed to be easily removed from its normal operating position for maintenance and servicing process

3.21**detection circuit**

transmission path which connects points to the control and indicating equipment (see Figure 1, item B)

NOTE Compare **point** (3.73) and **transmission path** (3.103).

3.22

detection concept

description of the design of the fire detection and alarm system with a justification of the choice of detectors, its sensitivity and its spacing; description of the alarm organization, i.e. all measures to be taken in case of an alarm

3.23

detection signal

signal from a detection device (see Figure 1, item A) to show that a fire has been detected

3.24

detector response

defined change of the status of a fire detector after actuation of an alarm signal

3.25

differential detector

detector which initiates an alarm when the difference (normally small) in the magnitudes of the measured phenomenon at two or more places exceeds a certain value for a specified time

3.26

earth fault

unwanted connection between earth potential and any part of the control and indicating equipment (see Figure 1, item B), transmission paths to the control and indicating equipment, or transmission paths between parts of the control and indicating equipment

3.27

emergency

imminent risk or serious threat to persons or property

3.28

emergency detection system

application intended for the protection of life, property or the environment such as

- fire detection system,
- gas detection system,
- intrusion and hold-up alarm,
- closed circuit television,
- access control,
- manual call point.

3.29

emergency management plan

documented procedure that considers all aspects of the management of an emergency to ensure the safety of building occupants

NOTE The emergency management plan is likely to include the evacuation of building occupants, but under certain circumstances, the retention of occupants in their current locations can be preferable.

3.30

evacuation plan

part of the emergency management plan dealing with the safe and orderly evacuation of building occupants

3.31**evacuate signal**

audible or visual signal or a combination of audible and visual signals complying with ISO 8201 that means "evacuate the building immediately"

3.32**fault warning routing equipment**

intermediate equipment which routes a fault warning from the control and indicating equipment (see Figure 1, item B) to a fault warning receiving station (see Figure 1, item K)

See Figure 1, item J.

3.33**fault warning receiving station**

centre from which the necessary corrective measures can be initiated on receipt of a fault signal

See Figure 1, item K.

3.34**field**

subdivision of a window

3.35**final voltage**

lowest recommended voltage to which a battery should be discharged

NOTE The final voltage is specified by the battery manufacturer.

3.36**fire alarm receiving station**

centre, on or remote from the protected premises, from which the necessary fire protection or firefighting measures can be initiated at any time on receipt of a fire alarm signal

See Figure 1, item F.

3.37**fire alarm routing equipment**

intermediate equipment which routes an alarm signal from the control and indicating equipment (see Figure 1, item B) to a fire alarm receiving station (see Figure 1, item F)

See Figure 1, item E.

3.38**fire alarm signal**

signal, which may be electrical, mechanical, audible, visual, etc to show that a hazard from fire exists in an area

NOTE The signal may be local, addressed to the occupants of the area, or remote, addressed to other people or organizations from whom assistance may be required.

3.39**fire alarm signalling device**

equipment, not incorporated in the control and indicating equipment (see Figure 1, item B) which is used to give a warning of fire, e.g. audible sounder or visual signalling device

See Figure 1, item C.

3.40

fire detector

part of an automatic fire detection system that contains at least one sensor which constantly or at frequent intervals monitors at least one suitable physical and/or chemical phenomenon associated with fire, and that provides at least one corresponding signal to the control and indicating equipment (see Figure 1, item B)

See Figure 1, item A.

NOTE The decision to give that alarm of fire or to operate automatic fire protection equipment may be made at the detector or at the control and indicating equipment.

3.41

first alarm signal

signal from a fire detector or manual call point which is interpreted as a fire alarm, but following which the control and indicating equipment (see Figure 1, item B) enters a first alarm state

3.42

first alarm state

state of the control and indicating equipment (see Figure 1, item B) following the receipt of a first alarm signal during which mandatory functions of the control and indicating equipment might be inhibited

3.43

flame detector

detector which responds to the radiation emitted by flames

3.44

float voltage

voltage that when applied to the battery maintains the battery in a fully charged state

3.45

functional condition

condition characterized by its indication

3.46

gas-sensing fire detector

detector sensitive to gaseous products of combustion and/or thermal decomposition

3.47

heat detector

detector sensitive to abnormal temperature and/or rate of temperature rise and/or temperature differences

3.48

indicator

device which can change its state to give information

3.49

intelligibility

measure of the proportion of the content of a speech message that can be correctly understood

NOTE Satisfactory intelligibility requires adequate audibility and adequate clarity.

3.50

indication

information given by an indicator

3.51

integrated power supply equipment

equipment for which it is not possible for the manufacturer to specify the output voltage range(s) of the power supply input voltage range(s) and if in the case of a defective power supply equipment (see Figure 1, item L), where the repair by replacement of the power supply equipment involves replacement of a part or the whole other equipment

3.52**ionization smoke detector**

detector sensitive to combustion products capable of affecting ionization currents within the detector

3.53**least sensitive orientation**

point of rotation, relative to air flow, about the vertical axis where a detector produces the maximum response threshold value

3.54**line detector**

detector that responds to the phenomenon monitored in the vicinity of a continuous line

3.55**locally resettable detector**

resettable detector that can be restored to its normal state of readiness to detect by a manual operation carried out at the detector

3.56**log**

record of essential events relating to the fire detection and alarm system

3.57

m

absorbance index

measured light attenuation characterizing the concentration of particulates in smoke or an aerosol

3.58**mandatory**

qualification applied to those functions required to be provided and the functions' requirements and to the requirements of any optional functions that have requirements, if such optional functions are provided

3.59**manual call point**

device for the manual initiation of an alarm

See Figure 1, item D.

3.60**manual fire alarm system**

system (not containing fire detectors) in which an alarm of fire can only be initiated manually

3.61**maximum application temperature**

maximum temperature that can be expected to be experienced, even for short periods of time, in the absence of a fire condition

3.62**multipoint detector**

detector that responds to the phenomenon monitored in the vicinity of more than one compact sensor, such as thermocouples

3.63**multisensor fire detector**

detector incorporating sensors within one mechanical housing which responds to more than one physical phenomena of fire, e.g. smoke and heat, smoke and gas, or heat and gas

NOTE The mechanism for actuating alarm signals or for operating automatic fire protection equipment should be located with the detector or in another part of the system, for example at the control and indicating equipment.

3.64

multistate detector

detector which gives one of a limited number (greater than two) of output states relating to a normal condition, a fire alarm condition and other abnormal conditions

3.65

non-detachable detector

detector not designed to be easily removed from its normal operating position for maintenance and servicing process

3.66

non-resettable detector

detector which after response requires replacement or renewal of one or more component before it can be restored to its normal state of readiness to detect

3.67

non-resettable detector with exchangeable elements

detector which after response requires the renewal of a component or components to restore it to its normal state of readiness to detect

3.68

non-resettable detector without exchangeable elements

detector which after response cannot be restored from its alarm state to its normal state of readiness to detect, and must be replaced

3.69

non-volatile memory

memory elements which do not require the presence of an energy source for the retention of their contents

3.70

phased evacuation

plan using a sound system for emergency purposes to broadcast warning signals in a sequence most suitable to promote the rapid and orderly evacuation of building occupants

3.71

photoelectric smoke detector

detector sensitive to combustion products capable of affecting the absorption or scattering of radiation in the infrared, visible and/or ultraviolet region of the electromagnetic spectrum

3.72

planning

paper work, studies and analysis concerning the design of a fire detection and alarm system before starting wiring and hardware installation as e.g.

- design considerations,
- detection concept,
- drawings,
- quotations.

3.73

point

component connected to a detection circuit able to transmit, or receive information in relation to fire detection

NOTE Includes Figure 1, items A and D.

3.74**point detector**

detector that responds to the phenomenon monitored in the vicinity of a compact sensor

3.75**power supply**

source of power for the control and indicating equipment (see Figure 1, item B) and for those items fed with power from the control and indicating equipment

NOTE The power supply may include multiple power supplies (e.g. electricity from mains and standby sources).

See Figure 1, item L.

3.76**project plan**

layout of the whole wiring plan including the indication of the location of all components of the fire detection and alarm system

3.77**program**

software necessary to comply with at least the requirements of ISO 7240 (all parts), including initializing data, reset and interrupt vectors, operating code, and declarations

3.78**rate of rise detector**

detector which initiates an alarm when the rate of change of the measured phenomenon with time exceeds a certain value for a specified time

3.79**receiving station**

cf. **fire alarm receiving station** (3.36) or **fault warning receiving station** (3.33)

3.80**remotely resettable detector**

resettable detector that can be restored to its normal state of readiness to detect by an operation carried out remotely from the detector

3.81**reset**

operation capable of terminating the fire alarm condition and/or the fault warning condition

3.82**resettable detector**

detector which after response and on cessation of the conditions that caused the response, may be restored from its alarm state to its normal state of readiness to detect, without the renewal of any component

3.83**routing equipment**

cf. **fire alarm routing equipment** (3.37) or **fault warning routing equipment** (3.32)

3.84**running data**

alterable data subject to temporary modification during operation, either automatically or by manual controls

3.85**self-resetting detector**

resettable detector that will automatically restore itself to its normal state of readiness to detect