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Fire detection and alarm systems —

Part 1:
General and definitions

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

Reference number
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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7240-1 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting.*

ISO 7240 currently consists of part 1 as a general introduction; further parts will cover:

- Test methods of sensitivity to fire.
- Fire detectors (smoke detectors, heat detectors).
- Control and indicating equipment including power supplies.
- Test methods for compatibility of components.

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Introduction

A fire detection and alarm system is required to function satisfactorily not only in the event of a 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 is not intended to place any other restriction on the design and construction of such components.

If appropriate ISO 7240 may be applied to the detection part of extinguishing systems, excluding sprinkler heads, although the sensitivity requirements may not be applicable in every instance.

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Fire detection and alarm systems —

Part 1: General and definitions

1 Scope

ISO 7240 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.

This part of ISO 7240 specifies the scope of the entire Standard and provides a set of definitions for use in the parts.

ISO 7240 applies to fire detection and alarm systems for buildings. It may also 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.

The components that a fire detection and alarm system may have are shown in figure 1.

Fire detectors may be self-contained: these are devices containing within one housing all the components, except possibly the energy source, necessary for detecting fire and giving an audible alarm. Self-contained smoke alarms will be covered in ISO 7204[1)].

NOTE — Inter-connected self-contained smoke alarms 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

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 appropriate action can be taken (e.g. evacuation of occupants, summoning the fire-fighting organization, 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 a guide 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 functions;

— 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 will attract 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 jeopardise 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;

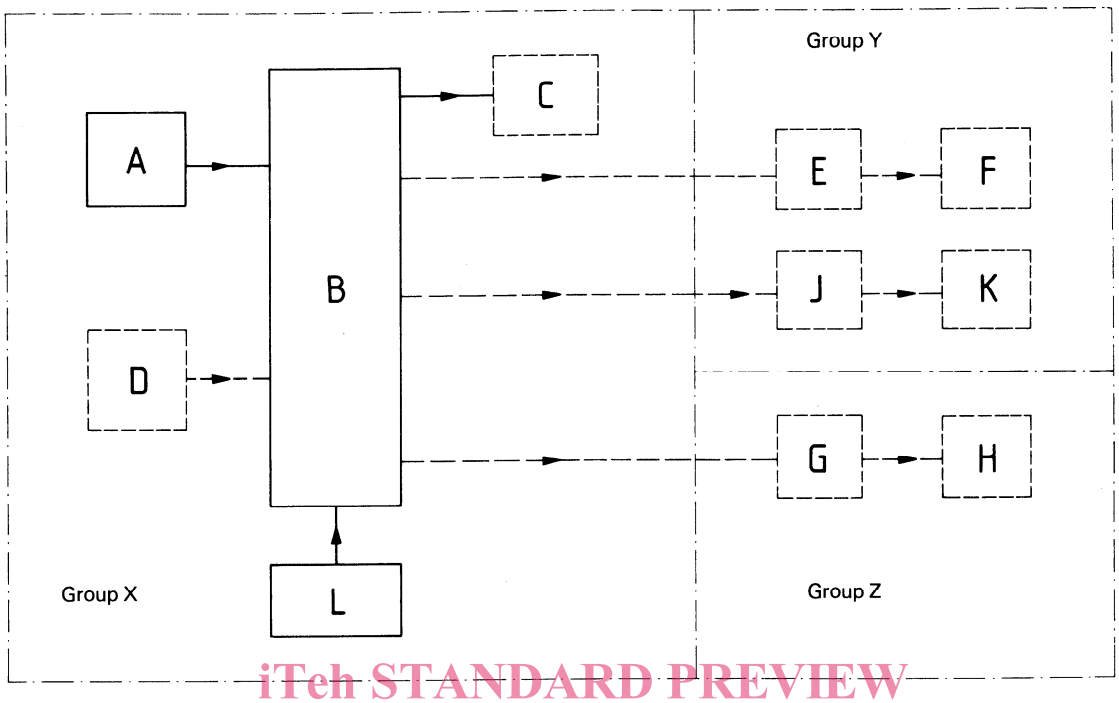
— be rendered partially or totally inoperative by the fire or the phenomenon which it is designed to detect before the fire or phenomenon has been detected.

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

2.6 Compliance of components with ISO 7240 does not necessarily ensure the compatibility of components with each other. Compatibility should be considered when designing a system. 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.

1) In preparation.



Key

A Fire detector
B Control and indicating equipment
C Fire-alarm signalling device
D Manual call point [manual station]
E Fire-alarm routing [transmitting] equipment
F Fire-alarm receiving station
G Control for automatic fire protection equipment
H Automatic fire protection equipment
J Fault [trouble] warning routing equipment
K Fault warning [trouble signal] receiving station
L Power supply

NOTE — Transmission and reception of fire-alarm and 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 follows:

———————— Equipment and connection elements that will always be 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

3 Definitions

For the purposes of this International Standard (i.e. all parts of ISO 7420), the following definitions apply.

3.1 automatic fire detection (and alarm) system: System in which an alarm of fire may be initiated automatically.

3.2 manual fire alarm system: System (not containing fire detectors) in which an alarm of fire may only be initiated manually.

3.3 fire detector (see figure 1, item A): 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). The decision to give the alarm of fire or to operate automatic fire protection equipment may be made at the detector or at the control and indicating equipment.

Fire detectors may be defined according to the phenomenon monitored, as in 3.3.1 to 3.3.5.

3.3.1 heat detector: Detector sensitive to abnormal temperature and/or rate of temperature rise and/or temperature differences.

3.3.2 smoke detector: Detector sensitive to particles of solid or liquid products of combustion and/or pyrolysis suspended in the atmosphere.

A smoke detector may be further subdivided as follows.

3.3.2.1 ionization smoke detector: Detector sensitive to combustion products capable of affecting ionization currents within the detector.

3.3.2.2 optical [photoelectric] smoke detector: Detector sensitive to combustion products capable of affecting the absorption or scattering of radiation in the infared, visible and/or ultraviolet region of the electromagnetic spectrum.

3.3.3 gas-sensing fire detector: Detector sensitive to gaseous products of combustion and/or thermal decomposition.

3.3.4 flame detector: Detector which responds to the radiation emitted by flames.

3.3.5 combination detector: Detector combining two or more detecting principles in a single housing.

Fire detectors may also be defined according to the way they respond to the phenomenon monitored, as in 3.3.6 to 3.3.8.

3.3.6 static detector: Detector which initiates an alarm when the magnitude of the measured phenomenon exceeds a static or fixed value for a specified time.

3.3.7 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.

3.3.8 rate of change [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.

Detectors may also be defined according to the configuration of the sensor, as in 3.3.9 to 3.3.11.

3.3.9 point [spot] detector: Detector that responds to the phenomenon monitored in the vicinity of a compact sensor.

3.3.10 multipoint detector: Detector that responds to the phenomenon monitored in the vicinity of more than one compact sensor, such as thermocouples.

3.3.11 line detector: Detector that responds to the phenomenon monitored in the vicinity of a continuous line.

Detectors may also be defined according to whether or how they can be re-used after operation, as in 3.3.12 to 3.3.13.2.

3.3.12 resettable [restorable] 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.

A resettable detector may be further subdivided as follows.

3.3.12.1 self-resetting [self-restoring] detector: Resettable detector that will automatically restore itself to its normal state of readiness to detect.

3.3.12.2 remotely resettable [restorable] detector: Resettable detector that can be restored to its normal state of readiness to detect by an operation carried out remotely from the detector.

3.3.12.3 locally resettable [restorable] detector: Resettable detector that can be restored to its normal state of readiness to detect by a manual operation carried out at the detector.

3.3.13 non-resettable [non-restorable] detector: Detector which requires replacement, or the renewal of one or more components, before it can be restored to its normal state of readiness to detect.

A non-resettable detector may be further subdivided as follows.

3.3.13.1 non-resettable [non-restorable] 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.

3.3.13.2 non-resettable [non-restorable] 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.

Detectors may also be defined according to the detachability of the detector for servicing and maintenance, as in 3.3.14 and 3.3.15.

3.3.14 detachable detector: Detector designed to be easily removed from its normal operating position for maintenance and servicing purposes.

3.3.15 non-detachable detector: Detector not designed to be easily removed from its normal operating position for maintenance and servicing purposes.

Detectors may lastly be defined according to the type of signal transmitted, as in 3.3.16 to 3.3.18.

3.3.16 two-state detector: Detector which gives one of two output states relating to either "normal" or "fire-alarm" conditions.

3.3.17 multistate detector: Detector which gives one of a limited number (greater than two) of output states relating to "normal" or "fire-alarm" and other abnormal conditions.

3.3.18 analogue detector: Detector which gives an output signal representing the value of the sensed phenomenon. This may be a truly analogue signal or a digitally encoded equivalent of the sensed value. This detector does not itself make a decision of fire-alarm.

3.4 control and indicating equipment (see figure 1, item B): Equipment through which detectors may be supplied with power and which

(1) is used to accept a detection signal and to activate a fire-alarm signal. This equipment may also be required to indicate the location of the fire and to record any of this information;

(2) 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 organization or, through the control for automatic fire protection equipment (see figure 1, item G), to, for example, an automatic extinguishing installation;

(3) is used to monitor automatically the correct functioning of the system and give audible and visible warning of specified faults.

3.5 fire-alarm signalling device (see figure 1, item C): 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 optical signalling device.

3.6 manual call point; manual station (see figure 1, item D): Device for the manual initiation of an alarm.

3.7 fire-alarm routing [transmitting] equipment (see figure 1, item E): Intermediate equipment which routes [transmits] 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).

3.8 fire-alarm receiving station (see figure 1, item F): Centre, on or remote from the protected premises, from which the necessary fire protection or fire-fighting measures can be initiated at any time on receipt of a fire-alarm signal.

3.9 control for automatic fire protection equipment (see figure 1, item G): Automatic device used to actuate automatic fire protection equipment (see figure 1, item H) after receiving a signal from the control and indicating equipment.

3.10 automatic fire protection equipment (see figure 1, item H): Fire control or fire-fighting equipment e.g. control of smoke doors, dampers, fans or an automatic extinguishing installation.

3.11 fault [trouble] warning routing equipment (see figure 1, item J): Intermediate equipment which routes a fault warning [trouble signal] from the control and indicating equipment (see figure 1, item B) to a fault warning [trouble signal] receiving station (see figure 1, item K).

3.12 fault warning [trouble signal] receiving station (see figure 1, item K): Centre from which the necessary corrective measures can be initiated on receipt of a fault [trouble] signal.

3.13 power supply (see figure 1, item L): 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. The power supply (see figure 1, item L) may include multiple power supplies (e.g. electricity from mains and standby sources).

3.14 connection elements: All those elements which form the links between the equipment defined in 3.3 to 3.13.

3.15 signals: Signals and indications of fire within the system subdivided into 3.15.1 to 3.15.3.

3.15.1 detection signal: Signal from a detection device (see figure 1, item A) to show that a fire has been detected.

3.15.2 alarm indication: Indication (at the indicating equipment, see figure 1, item B) to show that a detection signal has been received.

3.15.3 fire-alarm signal: Signal, which may be electrical, mechanical, audible, visual, etc. to show that a hazard from fire exists in an area. The signal may be local, addressed to occupants of the area, or remote, addressed to other people or organizations from whom assistance may be required.

4 Components of fire detection and alarm systems

The various possible components (items A-L) listed in figure 1 may be combined in different ways to meet the requirements of individual installations. For example a system may be brought into operation either by a manual call point D or a fire detector A or by both. Similarly the fire-alarm signal may be transmitted to a remote location such as a fire-alarm receiving station F or may be limited to fire-alarm signalling devices C giving warning on the premises. Additionally a system may initiate the operation of local automatic fire protection equipment H.

5 Test determination

Components of automatic fire detection systems should comply with the appropriate parts of this International Standard.

Detectors that do not include a decision-making element (see 3.3.18) can only be considered to comply with the appropriate part of ISO 7240 when in conjunction with that part of the system which includes the decision-making element.