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**Smoke alarms using scattered light,  
transmitted light or ionization**

*Détecteurs de fumée à lumière dispersée, lumière transmise  
ou ionisation*



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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 12239 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 12239:2003), which has been technically revised.

## Introduction

This International Standard for smoke alarms is drafted on the basis of functions that are to be provided on all smoke alarms covered by this standard, and optional functions with requirements which may be provided. It is intended that the options shall be used for specific applications, as recommended in application guidelines.

Each optional function is included as a separate entity, with its own set of associated requirements, in order to permit smoke alarms covered by this standard with different combinations of functions to conform to this International Standard.

Two optional sound output levels are specified in this International Standard. The options allow national regulators to specify minimum sound output levels (70 dBA or 85 dBA) as required under national regulations.

Two optional sound output patterns are specified in this International Standard. The options allow national regulators to choose a sound pattern complying with ISO 8201 or ISO 7731 depending on the desired response by building occupants to an alarm condition.

An optional extended temperature-range test is included for smoke alarms installed in areas subject to a greater temperature range, such as leisure accommodation vehicles.

Other functions may also be provided, even if not specified in this International Standard, if they do not jeopardize any function required by this document.

# Smoke alarms using scattered light, transmitted light or ionization

**IMPORTANT** — Certain types of smoke alarms contain radioactive materials. The national requirements for radiation protection differ from country to country and they are not specified in this International Standard. Such smoke alarms should, however, comply with the applicable national standards, which should be consistent with the recommendations of the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD).

## 1 Scope

This International Standard specifies requirements, test methods, performance criteria, and manufacturer's instructions for smoke alarms that operate using scattered light, transmitted light, or ionization, and are intended for household or similar residential applications.

For the testing of other types of smoke alarms, or smoke alarms working on different principles, this International Standard should be used only for guidance. Smoke alarms with special characteristics and developed for specific risks are not covered by this International Standard.

This International Standard allows, although it does not require, the inclusion within the smoke alarm of facilities for the following:

- visual alarm condition indication;
- visual fault condition indication;
- extended temperature-range operation;
- interconnection with other similar smoke alarms or accessories;
- alarm-silencing facility.

Where such facilities are included, this International Standard specifies applicable requirements.

This International Standard does not cover devices intended for incorporation in systems using separate control and indicating equipment. Such systems are specified in all parts of ISO 7240.

## 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 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 2919, *Radiation protection — Sealed radioactive sources — General requirements and classification*

ISO 7240-3, *Fire detection and alarm systems — Part 3: Audible alarm devices*

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

ISO 8201, *Acoustics — Audible emergency evacuation signal*

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

IEC 60065:2005, *Audio, video and similar electronic apparatus — Safety requirements*

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

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

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

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

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

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

IEC 60950-1:2005, *Information technology equipment — Safety — Part 1: General requirements*

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

OECD, Recommendations for ionization chamber smoke detectors in implementation of radiation protection standards. Nuclear Energy Agency, Organisation for Economic Co-operation and Development, Paris, France. 1977

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **aerosol density**

smoke density

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

—  $m$  (3.9)

—  $y$  (3.18)

NOTE 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 these tests.

#### 3.2

##### **alarm condition**

audible signal specified by the manufacturer as indicating the existence of a fire

#### 3.3

##### **alarm-silence facility**

means of temporarily disabling or desensitizing a smoke alarm

#### 3.4

##### **battery-low condition**

combination of battery voltage and series resistance which results in a fault warning