
Fire detection and alarm systems —
Part 15:
Point-type fire detectors using smoke
and heat sensors

Systèmes de détection et d'alarme d'incendie —

*Partie 15: Détecteurs linéaires de fumée utilisant une transmission
par faisceaux lumineux*



This document is a preview generated by EBS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested 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	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms, definitions, and abbreviations	2
3.1 Terms and definitions	2
3.2 Abbreviated terms	2
4 Requirements	2
4.1 Compliance	2
4.2 Design considerations	2
4.3 Smoke-response value of detectors using scattered or transmitted light	2
4.4 Individual alarm indication	3
4.5 Indication of other conditions	3
4.6 Connection of ancillary devices	3
4.7 Monitoring of detachable detectors	3
4.8 Manufacturer's adjustments	3
4.9 On-site adjustment of response behaviour	3
4.10 Response to slowly developing fires	4
4.11 Protection against ingress of foreign bodies	4
4.12 Software-controlled detectors	4
5 Tests	6
5.1 General	6
5.2 Repeatability of smoke response	9
5.3 Directional dependence of smoke response	10
5.4 Directional dependence of heat response	11
5.5 Reproducibility of smoke response	11
5.6 Reproducibility of heat response	12
5.7 Lower limit of heat response	12
5.8 Air movement	13
5.9 Dazzling	14
5.10 Variation in supply parameters (voltage)	14
5.11 Dry heat (operational)	15
5.12 Cold (operational)	16
5.13 Damp heat, cyclic (operational)	17
5.14 Damp heat, steady-state (endurance)	18
5.15 Sulfur dioxide (SO ₂) corrosion (endurance)	19
5.16 Shock (operational)	20
5.17 Impact (operational)	21
5.18 Vibration, sinusoidal (operational)	22
5.19 Vibration, sinusoidal (endurance)	24
5.20 Electromagnetic compatibility (EMC)	25
5.21 Detectors with more than one smoke sensor — Optional test	25
5.22 Fire sensitivity	26
6 Test report	28
7 Marking	28
8 Data	29
Annex A (normative) Compensation for detector drift	30
Annex B (normative) Smoke tunnel for smoke-response value measurements	35
Annex C (normative) Heat tunnel for heat-response value measurements	40

Annex D (normative) Apparatus for the dazzling test	41
Annex E (normative) Apparatus for the impact test	42
Annex F (normative) Fire test room	44
Annex G (normative) Open cellulosic (wood) fire (TF1)	46
Annex H (normative) Smouldering (pyrolysis) wood fire (TF2)	48
Annex I (normative) Glowing smouldering cotton fire (TF3)	51
Annex J (normative) Flaming plastics (polyurethane) fire (TF4)	53
Annex K (normative) Flaming liquid (<i>n</i>-heptane) fire (TF5)	56
Annex L (normative) Low-temperature black-smoke liquid (decalin) fire (TF8)	58
Annex M (informative) Construction of the measuring ionization chamber	60
Annex N (informative) Construction of the heat tunnel	63

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is 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 7240-15:2004), 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 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: Design, installation, commissioning and service of fire detection and fire alarm systems in and around buildings*
- *Part 15: Point-type fire detectors using smoke and heat sensors*
- *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 devices*
- *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*

The following part is under preparation:

- *Part 29: Video fire detectors*

Introduction

This part of ISO 7240 is prepared by ISO/TC 21/SC 3, the secretariat of which is held by SA, and is based on ISO 7240-15:2004.

Point-type fire detectors using smoke and heat sensors are general purpose fire detectors for installation in and around buildings. Multi-sensor detectors respond to a broad range of fires and can be designed to achieve high stability against deceptive phenomena that can result in unwanted alarms.

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 it is likely to meet in practice, including corrosion, vibration, direct impact, indirect shock and electromagnetic interference. Specific tests are intended to assess the performance of detectors under such conditions.

This edition introduces a requirement that smoke sensors that operate on the principle of scattered or transmitted light to be marked with one of two possible nominal response threshold bands. The availability of two of response threshold bands provides installation designers with a detector selection choice to further reduce the risk of unwanted alarms in installations where unfavourable environmental conditions are present.

This edition introduces additional requirements for smoke detectors with more than one smoke sensor.

Fire detection and alarm systems —

Part 15:

Point-type fire detectors using smoke and heat sensors

1 Scope

This part of ISO 7240 specifies requirements, test methods, and performance criteria for point-type fire detectors using smoke and heat sensors, incorporating in one mechanical enclosure at least one smoke sensor and at least one other sensor which responds to heat, and in which the signal(s) of the smoke sensor(s) is (are) combined with the signal(s) of the heat sensor(s).

The performance of a single sensor within the detector covered by this part of ISO 7240 cannot be sufficient for conformity to other parts of ISO 7240 for the single sensor detector.

Certain types of detectors can contain radioactive materials. The national requirements for radiation protection differ from country to country and they are not therefore specified in this standard. However, such detectors are expected to conform to the national requirements and be in line with the recommendations of the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD)¹⁾.

For the testing of other types of detectors, or detectors working on different principles, this part of ISO 7240 can be used only for guidance. Detectors with special characteristics, developed for specific risks, are not covered in this part of ISO 7240.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 7240-1, *Fire detection and alarm systems — Part 1: General and definitions*

ISO 7240-5:2012, *Fire detection and alarm systems — Part 5: Point-type heat detectors*

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

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

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

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

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

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

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

¹⁾ OECD, *Recommendations for ionization smoke detectors in implementation of radiation protection standards*. Nuclear Energy Agency, Organisation for economic Co-operation and Development, Paris, France

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*

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 abbreviations

3.1 Terms and definitions

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

3.2 Abbreviated terms

FDCIE fire detection control and indicating equipment

4 Requirements

4.1 Compliance

In order to comply with this part of ISO 7240, the detector shall meet the following requirements.

- a) [Clause 4](#), which shall be verified by visual inspection or engineering assessment, shall be tested in accordance with [Clause 5](#) and shall meet the requirements of the tests.
- b) [Clauses 7](#) and [8](#), which shall be verified by visual inspection.

4.2 Design considerations

Detectors shall be so designed that the signal(s) from the smoke sensor(s), combined with the signal(s) from the heat sensor(s), release an alarm signal.

NOTE In some cases, an alarm signal can result from only one element, but the overall fire performance is dependent on signals from more than one sensor being combined in some form of signal processing.

4.3 Smoke-response value of detectors using scattered or transmitted light

Detectors using scattered or transmitted light shall conform to one of the two response threshold value bands specified in [Table 1](#) and the corresponding end-of-test conditions for the test fires specified in [5.22](#).

Table 1 — Smoke-response value for detectors using scattered or transmitted light

Smoke-response value in smoke tunnel (aerosol) dB/m		Test fires end-of-test conditions					
		TF1 dB/m	TF2 dB/m	TF3 dB/m	TF4 dimensionless	TF5 dimensionless	TF8 dB/m
1	$0,05 < m < 0,3$	$m = 2$	$m = 2$	$m = 2$	$y = 6$	$y = 6$	$m = 1,7$
2	$0,2 < m < 0,6$	$m = 2$	$m = 2$	$m = 2$	$y = 6,5$	$y = 7,5$	$m = 1,7$
NOTE The smaller the m value, the higher the sensitivity of the detectors.							