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Fire detection and alarm systems —

Part 31: Resettable line-type heat detectors

Systèmes de détection et d'alarme incendie —

Partie 31: Détecteurs de chaleur en ligne resetable

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 7240 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Resettable line-type heat detectors (RLTHD) have been incorporated into fire alarm systems for a considerable number of years. These detectors are typically used in areas where point-type heat detectors are presented with challenging environmental characteristics and also where access to the detectors can significantly influence the fire alarm system design.

This document gives common requirements for the construction and robustness of line-type heat detectors, as well as for their performance under climatic, mechanical and electrical interference conditions which are likely to occur in the service environment

This document defines the minimum system functionality for RLTHD products. RLTHD are based upon many unique operating principles. It is the intention of this document to define common operating characteristics for each type of RLTHD in conjunction with existing ISO 7240 detector International Standards, so that resettable line-type heat detectors have a response behaviour comparable to that of point-type heat detectors.

Generally, there are three functional principles employed by RLTHD: non-integrating systems, integrating systems and ror-only detectors; separate subclasses have been created for each of these systems.

Fire detection and alarm systems —

Part 31: Resettable line-type heat detectors

1 Scope

This document applies to resettable line-type heat detectors consisting of a sensing element distributed either continuously or discretely at close intervals along its length and connected to a sensor control unit, either directly or through an interface module, intended for use in fire detection and fire alarm systems installed in and around buildings and other civil engineering works. Examples of such technology are an optical fibre, a pneumatic tube, or an electrical sensor cable

This document specifies the requirements and performance criteria, the corresponding test methods, and provides for the assessment.

This document also covers resettable line-type heat detectors intended for use in the local protection of plants and equipment.

This document does not cover non-resettable line-type heat detectors that can only respond once and are based on fixed temperature electrical cables.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Fire detection and alarm systems — Part 1: General and definitions*

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

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

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 62599-2, *Alarm systems — Part 2: Electromagnetic compatibility — Immunity requirements for components of fire and security alarm systems*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
environmental group
group used to designate the level of severity, applied during environmental tests

Note 1 to entry: The level should reflect service environment to which the components of specimens under test are subjected.

3.2
functional unit
part of a *line-type heat detector* (3.5) in addition to the *sensor control unit* (3.12) and the *sensing element* (3.11) which is essential for the function of the line-type heat detector

EXAMPLE Terminating device, filter, switch.

3.3
integrating line-type heat detector
detector for which the response to temperature is summed in a certain way (not necessarily linearly), along a length of the *sensing element* (3.11)

Note 1 to entry: For such detectors, the output to the *sensor control unit* (3.12) is a function of the temperature distribution along the length of the sensing element.

EXAMPLE Pneumatic systems.

3.4
linear heat detector
linear line-type heat detector
detector which responds to heat applied to any point along the length of the *sensing element* (3.11)

3.5
line-type heat detector
LTHD
detector which responds to heat sensed in the vicinity of a continuous line

Note 1 to entry: A line-type heat detector may consist of a *sensor control unit* (3.12), a *sensing element* (3.11) and *functional units* (3.2).

3.6
multipoint heat detector
multipoint line-type heat detector
detector that contains multiple discrete temperature sensors which are separated by a distance of no more than 10 m, embedded within the *sensing element* (3.11)

3.7
non-integrating RLTHD
non-integrating line-type heat detector
detectors for which the output signal is dependent on local temperature effects but not on the integration of the whole temperature distribution along the *sensing element* (3.11)

EXAMPLE Fibre optics systems.

3.8
ror-only detector
line-type heat detector (3.5) which responds to a temperature rise but does not have a fixed operating temperature

3.9
resettable line-type heat detectors
RLTHD
line-type heat detector (3.5) which is able to return to its quiescent condition after a response

3.10
room protection application
application in which the *sensing element* (3.11) is installed at a distance from the potential fire hazard close to the ceiling or roof of the area to be protected

EXAMPLE Car parks (open or closed), road/rail/metro tunnels, floor/ceiling voids, elevator shafts, cold stores, warehouses, heritage buildings, aircrafts hangars, spray shops, chemical storehouses, ammunition depots, refineries, silos, etc.

3.11
sensing element
heat sensing part of the *line-type heat detector* (3.5)

EXAMPLE A fibre optic cable, a pneumatic tube or an electrical cable

Note 1 to entry: A sensing element may consist of different segments separated for example by *functional units* (3.2) or splices.

3.12
sensor control unit
unit that supervises the *sensing element* (3.11) and communicates to the control and indicating equipment

Note 1 to entry: The unit can be remote or an integral part of the control and indicating equipment as defined by ISO 7240-2.

4 Requirements

4.1 General

4.1.1 Conformance

In order to conform to this document, the detector shall meet the requirements of Clause 4, which shall be verified by inspection and engineering assessment, and when tested in accordance with the tests described in Clause 5, the detector shall meet the requirements of the tests.

4.1.2 Heat response classes

4.1.2.1 Heat response for Class A integrating and non-integrating RLTHD

For Class A application the heat response of RLTHD is classified as indicated in Table 1.

NOTE Test fires TF6S, TF6 and TF6F are specified in Annex B.

Table 1 — Heat response for Class A

Heat response class		Typical application temperature	Maximum application temperature	Minimum static response temperature	Maximum static response temperature	TF6S		TF6		TF6F	
						Response time		Response time		Response time	
Non-integrating RLTHD	Integrating RLTHD	°C	°C	°C	°C	Lower value s	Upper value s	Lower value s	Upper value s	Lower value s	Upper value s
A1N	A1I	25	50	54	65	50	400	30	210	20	130

Table 1 *(continued)*

Heat response class		Typical application temperature °C	Maximum application temperature °C	Minimum static response temperature °C	Maximum static response temperature °C	TF6S		TF6		TF6F	
						Response time		Response time		Response time	
Non-integrating RLTHD	Integrating RLTHD					Lower value s	Upper value s	Lower value s	Upper value s	Lower value s	Upper value s
A2N	A2I	25	50	54	70	120	600	60	300	40	180

4.1.2.2 Heat response for higher application temperatures RLTHD

For higher temperature applications the heat response of the RLTHD is classified as indicated in Table 2.

Table 2 — Heat response for higher application temperatures of integrating and non-integrating RLTHD

Heat response class		Typical application temperature °C	Maximum application temperature °C	Minimum static response temperature °C	Maximum static response temperature °C
Non-integrating RLTHD	Integrating RLTHD				
BN	BI	40	65	69	85
CN	CI	55	80	84	100
DN	DI	70	95	99	115
EN	EI	85	110	114	130
FN	FI	100	125	129	145
GN	GI	115	140	144	160

4.1.2.3 Heat response for ror-only RLTHD

For ror-only RLTHD the heat response is classified as indicated in Table 3.

Table 3 — Heat response for ror-only RLTHD

Heat response class		Typical application temperature °C	Maximum application temperature °C	TF6		TF6F	
				Response time		Response time	
Non-integrating RLTHD	Integrating RLTHD			Lower value s	Upper value s	Lower value s	Upper value s
A1NR	A1IR	25	50	30	210	20	130
A2NR	A2IR	25	50	60	300	40	180

NOTE Test fires TF6 and TF6F are specified in Annex B.

4.1.2.4 Response classes from typical higher application temperature for ror-only detectors

For higher temperature application ror-only RLTHD the heat response is classified as indicated in Table 4.

Table 4 — Heat response, for integrating ror-only RLTHD

Heat response class for ror-only RLTHD	Typical application temperature °C	Maximum application temperature °C
BIR	40	65
CIR	55	80
DIR	70	95
EIR	85	110
FIR	100	125
GIR	115	140

4.1.2.5 Environmental groups

Different environmental groups are necessary to reflect the different service environment of the components of a line-type heat detector.

The sensing element shall meet the requirements of environmental groups II or III. The sensor control unit and the functional unit shall meet the requirements of environmental groups I, II or III.

Environmental group I covers equipment likely to be installed indoors in commercial/industrial premises but for which the avoidance of extreme environmental conditions can be taken into account in the selection of the mounting site.

Environmental group II covers equipment likely to be installed indoors in commercial/industrial premises in all general areas.

Environmental group III covers equipment which is intended to be installed outdoors and in harsh environments such as tunnels.

4.2 Individual alarm indication

Each sensor control unit shall be provided with an integral red visual indicator, by which the alarm condition of the sensing element can be identified, until the alarm condition is reset. Where other conditions of the sensor control unit can be visually indicated, they shall be clearly distinguishable from the alarm indication, except when the sensor control unit is switched into a service mode. The visual indicator shall be visible from a distance of 6 m in the direct line of sight perpendicular to the surface, in an ambient light intensity of up to 500 lux.

If more than one sensing element is connected to the sensor control unit, there shall be a separate alarm indication for each sensing element.

To confirm this, the detector shall be assessed in accordance with 5.2.

4.3 Signalling

The line-type heat detector shall signal the alarm and fault status to the control and indicating equipment.

If more than one sensing element is connected to a sensor control unit, there shall be separate alarm and fault signals for each sensing element.

To confirm this, the detector shall be assessed in accordance with 5.3.