SLOVENSKI STANDARD
SIST EN 54-22:2015

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Sistemi za odkrivanje in javljanje požara ter alarmiranje - 22. del: Linijski toplotni javljalniki z možnostjo ponastavitve

Fire detection and fire alarm system - Part 22 : Resettable line-type heat detectors

Brandmeldeanlagen - Teil 22 : Rücksetzbare linienförmige Wärmemelder

Systèmes de détection et d'alarme incendie - Partie 22 : Détecteurs de chaleur de type linéaire réenclenchables

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Fire detection and fire alarm systems - Part 22: Resettable line-type heat detectors

Systèmes de détection et d'alarme incendie - Partie 22: Détecteurs de chaleur de type linéaire réenclenchables

Brandmeldeanlagen - Teil 22: Rücksetzbare linienförmige Wärmemelder

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Foreword

This document (EN 54-22:2015) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarm systems”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2015, and conflicting national standards shall be withdrawn at the latest by May 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the basic requirements of Regulation (EU) 305/2011.

For relationship with EU Directive(s), see informative Annex ZA which is an integral part of this document.

EN 54 "Fire detection and fire alarm systems" consists of the following parts:

Part 1: Introduction

Part 2: Control and indicating equipment

Part 3: Fire alarm devices – Sounders

Part 4: Power supply equipment

Part 5: Heat detectors – Point detectors

Part 7: Smoke detectors – Point detectors using scattered light, transmitted light or ionization

Part 10: Flame detectors – Point detectors

Part 11: Manual call points

Part 12: Smoke detectors – Line detector using an optical light beam

Part 13: Compatibility assessment of system components

Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance

Part 15: Point detectors using a combination of detected phenomena

Part 16: Voice alarm control and indicating equipment

Part 17: Short circuit isolators

Part 18: Input/output devices

Part 20: Aspirating smoke detectors

Part 21: Alarm transmission and fault warning routine equipment

Part 22: Resettable line-type heat detectors

Part 23: Fire alarm devices – Visual alarms

Part 24: Components of voice alarm systems – Loudspeakers

Part 25: Components using radio links and system requirements

Part 26: Carbon monoxide detectors – Point detectors (in preparation)

Part 27: Duct smoke detectors (in preparation)

Part 28: Non-resettable line-type heat detectors (in preparation)

Part 29: Multi-sensor fire detectors - Point detectors using a combination of smoke and heat sensors

Part 30: Multi-sensor fire detectors - Point detectors using a combination of carbon monoxide and heat sensors

Part 31: Multi-sensor detector – Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors

Part 32: Guidelines for the planning, design, installation, commissioning, use and maintenance of voice alarm systems

NOTE This list includes standards that are in preparation and other standards may be added. For current status of published standards refer to www.cen.eu.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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 may significantly influence the fire alarm system design.

This standard defines the minimum system functionality for RLTHD products. RLTHD are based upon many unique operating principles. It is the intention of this standard to define common operating characteristics for each type of RLTHD in conjunction with existing EN 54 detector standards, so that resettable line-type heat detectors have a response behaviour comparable to that of point type heat detectors.

Due to the various applications for RLTHD, it is necessary to devise separate environmental classification tests for the sensing element and the sensor control units of these systems. It is not the purpose of this standard to define applications or how RLTHD should be used in applications. However, the standard indicates two general fields of application, room protection and secondly local protection. The standard defines separate response test classifications for these two fields.

Generally there are two functional principles employed by RLTHD: non-integrating and integrating systems. Therefore separated subclasses have been created for non integrating systems and for integrating systems.

1 Scope

This European Standard applies to resettable line-type heat detectors consisting of a sensing element using an optical fibre, a pneumatic tube or an electrical sensor cable 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 (see EN 54-1:2011).

This European Standard specifies the requirements and performance criteria, the corresponding test methods and provides for the Assessment and Verification of Constancy of Performance (AVCP) of resettable line-type heat detectors to this EN.

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

Resettable line-type heat detectors with special characteristics and developed for specific risks are not covered by this EN.

This European Standard does not cover line-type heat detectors that are based on non-resettable, fixed temperature electrical cables (so called “digital” systems).

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.

EN 54-1:2011, *Fire detection and fire alarm systems — Part 1: Introduction*

EN 54-7:2000, *Fire detection and fire alarm systems — Part 7: Smoke detectors — Point detectors using scattered light, transmitted light or ionization*

EN 50130-4:2011, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems*

EN 60068-1:1994, *Environmental testing — Part 1: General and guidance (IEC 60068-1:1988 + Corrigendum 1988 +A1:1992)*

EN 60068-2-1:2007, *Environmental testing — Part 2-1: Tests — Test A: Cold (IEC 60068-2-1:2007)*

EN 60068-2-2:2007, *Environmental testing — Part 2-2: Tests — Test B: Dry heat (IEC 60068-2-2:2007)*

EN 60068-2-27:2009, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock (IEC 60068-2-27:2009)*

EN 60068-2-30:2005, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle) ((IEC 60068-2-30:2005)*

EN 60068-2-42:2003, *Environmental testing — Part 2-42: Tests — Test Kc: Sulphur dioxide test for contacts and connections ((IEC 60068-2-42:2003)*

EN 60068-2-6:2008, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal) (IEC 60068-2-6:2008)*

EN 60068-2-75:1997, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests (IEC 60068-2-75:1997)*

EN 60068-2-78:2001, *Environmental testing — Part 2-78: Tests — Test Cab: Damp heat, steady state (IEC 60068-2-78:2001)*

3 Terms, definitions and abbreviations

For the purposes of this document the terms and definitions given in EN 54-1:2011 and the following apply.

3.1 Terms and definitions

3.1.1
functional unit
part of a line-type heat detector in addition to the sensor control unit and the sensing element which is essential for the function of the line-type heat detector

EXAMPLE Terminating device, filter, switch.

3.1.2
integrating line-type heat detector
detectors for which the response to temperature is summed in some way, (not necessarily linearly), along a length of the sensing element. For such detectors, the output to the sensor control unit is therefore a function of the temperature distribution along the length of the sensing element

EXAMPLE Pneumatic systems.

3.1.3
linear line-type heat detector
detectors which respond to heat applied to any point along the length of the sensing element

3.1.4
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, a sensing element and functional units.

3.1.5
local protection application
application in which the sensing element is installed in relatively close proximity to the potential fire risk

EXAMPLE pipelines, conveyor belts, combustion engines/turbines, rolling stock, transformers, process dryers, cable trays, escalators, chemical process equipment, electrical equipment cabinets, ventilation systems (dust collector, hood extractor, etc.), switch gear (e.g. printing press), etc.

3.1.6
multipoint line-type heat detector
detectors that contain multiple discrete temperature sensors, which are separated by a distance of no more than 10 m, embedded within the sensing element (see 3.1.11)

3.1.7
non-resettable line-type heat detectors
NLTHD
LTHD which can only respond once

3.1.8
non-integrating line-type heat detector
detectors for which the output signal is depending on local temperature effects but not on the integration of the whole temperature distribution along the sensing element

EXAMPLE Fibre optics systems.

3.1.9
resettable line-type heat detectors
RLTHD
LTHD which is able to return to its quiescent condition after a response

3.1.10
room protection application
application in which the sensing element 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.

3.1.11
sensing element
heat sensing part of the line-type heat detector which can be a fibre optic cable, a pneumatic tube or an electrical cable

Note 1 to entry: A sensing element may consist of different segments separated e.g. by functional units or splices.

3.1.12
sensor control unit
unit that supervises the sensing element 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 EN 54-2.

3.2 Abbreviations

For the purposes of this document the following abbreviation apply:

RLTHD resettable line-type heat detector

4 Product characteristics

4.1 General

4.1.1 Compliance

In order to comply with this standard, resettable line-type heat detectors shall meet the provisions of Clause 4, which shall be verified by visual inspection or engineering assessment as described in Clause 5 and shall meet the requirements of the tests.

4.1.2 Heat response classes

4.1.2.1 Heat response for room protection application

For room protection 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, room protection for 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	TF6S response time		TF6 response time		TF6F response time	
non-integrating RLTHD	Integrating RLTHD					Lower values	Upper values	Lower values	Upper values	Lower values	Upper values
A1N	A1I	25	50	54	65	50	400	30	210	20	130
A2N	A2I	25	50	54	70	120	600	60	300	40	180

4.1.2.2 Heat response for local protection application

For local protection application the heat response of the RLTHD is classified as indicated in Table 2.

Table 2 —Heat response local protection for 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

4.1.3 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 is in either environmental group II or III.

The sensor control unit and the functional unit are in either environmental group I, II or III.

NOTE 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 out of doors.

4.2 Nominal activation conditions/sensitivity

4.2.1 Individual alarm indication

Each sensor control unit shall be provided with an integral red visual indicator, by which the general alarm condition 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 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 5.2.1.

4.2.2 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 5.2.2.

4.2.3 Repeatability

The ratio of response times of the RLTHD shall be within the limits, even after a number of alarm conditions, as specified in 5.2.3.

4.2.4 Reproducibility

The ratio of response times of several specimens of the RLTHD shall be within the limits as specified in 5.2.4.

4.3 Operational reliability

4.3.1 Connection of ancillary devices

Where the RLTHD provides for connections to ancillary devices (e.g. remote indicators, RS 485 interface), open or short-circuit failures of these connections shall not prevent the correct operation of the RLTHD.

Where such connections are present the detector shall be assessed in accordance with 5.3.1.

4.3.2 Manufacturer's adjustments

It shall not be possible to change the manufacturer's settings except by special means (e.g. the use of a key, a code or a special tool or by breaking or removing a seal).

To confirm this, the detector shall be assessed in accordance with 5.3.2.

4.3.3 Requirements for software controlled detectors

4.3.3.1 General

For RLTHD, which rely on software control in order to fulfil the requirements of this standard, the requirements of 4.3.3.2, 4.3.3.3 and 4.3.3.4 shall be met.

4.3.3.2 Software documentation

4.3.3.2.1 The manufacturer shall submit documentation, which gives an overview of the software design. This documentation shall provide sufficient detail for the design to be inspected for compliance with this standard and shall include the following as a minimum:

a) a functional description of the main program flow (e.g. as a flow diagram or structogram) including;

   1) a brief description of the modules and the functions that they perform,

   2) the way in which the modules interact,

3) the overall hierarchy of the program,

4) the way in which the software interacts with the hardware,

5) the way in which the modules are called, including any interrupt processing,

b) a description of which areas of memory are used for the various purposes (e.g. the program, site specific data and running data);

c) a designation, by which the software and its version can be uniquely identified.

4.3.3.2.2 The manufacturer shall have available detailed design documentation, which only needs to be provided if required by the testing laboratory. It shall comprise at least the following:

a) an overview of the whole system configuration, including all software and hardware components;

b) a description of each module of the program, containing at least:

1) the name of the module,

2) a description of the tasks performed,

3) a description of the interfaces, including the type of data transfer, the valid data range and the checking for valid data,

c) full source code listings, as hard copy or in machine-readable form (e.g. ASCII-code), including all global and local variables, constants and labels used, and sufficient comment for the program flow to be recognized;

d) details of any software tools used in the design and implementation phase (e.g. CASE-tools, compilers).

4.3.3.3 Software design

In order to ensure the reliability of the RLTHD, the following requirements for software design shall apply:

a) the software shall have a modular structure;

b) the design of the interfaces for manually and automatically generated data shall not permit invalid data to cause error in the program operation;

c) the software shall be designed to avoid the occurrence of deadlock of the program flow.

4.3.3.4 The storage of programs and data

The program necessary to comply with this standard and any preset data, such as manufacturer's settings, shall be held in non-volatile memory. Writing to areas of memory containing this program and data shall only be possible by the use of some special tool or code and shall not be possible during normal operation of the RLTHD.

Site-specific data shall be held in memory which will retain data for at least two weeks without external power to the detector, unless provision is made for the automatic renewal of such data, following loss of power, within 1 h of power being restored.

To confirm this, the detector shall be assessed in accordance with 5.3.3.

4.3.4 Sensing element fault

The RLTHD shall generate fault conditions as specified in 5.3.4.

4.3.5 On-site adjustment of response behaviour

The effective response behaviour of a RLTHD is dependent upon both the sensitivity settings of the sensor control unit and the heat sensing element. Many types of RLTHD therefore have facilities to adjust the sensitivity of the RLTHD to suit the application.

If there is provision for on-site adjustment of the response behaviour of the detector then:

a) for each setting, at which the manufacturer claims compliance with this standard, the detector shall comply with the requirements of this standard, and access to the adjustment means shall only be possible by the use of a code or special tool;

b) any setting(s), at which the manufacturer does not claim compliance with this standard, shall only be accessible by the use of a code or special tool, and it shall be clearly marked on the detector or in the associated data, that if these setting(s) are used, the detector does not comply with the standard.

NOTE These adjustments can be carried out at the sensor control unit or at the control and indicating equipment.

To confirm this, the detector shall be assessed in accordance with 5.3.5

4.3.6 Maximum ambient temperature test (sensing element)

The RLTHD shall function correctly even if the sensing element is exposed to high ambient temperatures as specified in 5.3.6.

4.4 Tolerance to supply voltage

4.4.1 Variation in supply parameters

The RLTHD shall function correctly within the specified range(s) of the supply parameters as specified in 5.4.1

4.4.2 Low voltage fault

The RLTHD shall signal a fault condition when its input power supply falls below the minimum voltage specified by the manufacturer as specified in 5.4.2

4.5 Performance parameters under fire conditions

4.5.1 Fire sensitivity for room protection application

Heat response Class A1N, A1I, A2N and A2I RLTHD (for room protection application) shall have an adequate sensitivity to the heat release of a real test fire as required for general application in fire detection systems as specified in 4.1.2.1.and tested as specified in 5.5.1

4.5.2 Static response temperature test

The RLTHD shall have, depending on its classification, an adequate sensitivity to a slow rate of rise of temperature as specified in 4.1.2.2.and tested as specified in 5.5.2.

The RLTHD shall also be capable of alarming when temperature rise is very slow and generate the alarm within a temperature range specified for its class.