SLOVENSKI STANDARD
SIST EN 54-28:2016

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Sistemi za odkrivanje in javljanje požara ter alarmiranje - 28. del: Linijski toplotni javljalniki brez ponastavitve

Fire detection and fire alarm system - Part 28: Non-resettable line-type heat detectors

Brandmeldeanlagen - Teil 28: Nicht-rücksetzbare linienförmige Wärmemelder

Systèmes de détection et d'alarme incendie - Partie 28 : Détecteurs de chaleur de type linéaire non réenclenchables

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Fire detection and fire alarm system - Part 28: Non-resettable line-type heat detectors

Systèmes de détection et d'alarme incendie - Partie 28 : Détecteurs de chaleur de type linéaire non réenclenchables

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European foreword

This document (EN 54-28:2016) 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of an identical text or by endorsement, at the latest by August 2016, and conflicting national standards shall be withdrawn at the latest by February 2020.

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 Regulations, 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 detectors using an optical 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 routing equipment*

— *Part 22: Resettable line-type heat detectors*

— *Part 23: Fire alarm devices – Visual alarm devices*

— *Part 24: Components of voice alarm systems – Loudspeakers*

— *Part 25: Components using radio links*

— *Part 26: Carbon monoxide detectors – Point detectors*

— *Part 27: Duct smoke detectors*

— *Part 28: Non-resettable line-type heat detectors*

— *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 fire detectors – 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

Non-resettable line-type heat detectors (NLTHD) have been used for a considerable number of years and are incorporated into fire detection systems and in some countries even into fire alarm systems if accepted by the relevant authorities. 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 NLTHD products.

Due to the various applications for NLTHD, 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 NLTHD should be used in applications.

Generally NLTHD operate on using the same basic principle. However, they can have different performance with respect to the temperature response. Therefore they have been differentiated by a type code which reflects the nominal alarm temperature, the tolerance range and the maximum ambient temperature at which they could be used.

1 Scope

This European Standard applies to non-resettable line-type heat detectors consisting of a sensing element using an electrical sensor cable which can be connected to a sensor control unit or either directly or through an interface module to a control and indicating equipment intended for use in fire detection and fire alarm systems installed in and around buildings and civil engineering works (see EN 54-1:2011).

The non-resettable sensing element has a fixed temperature alarm threshold and does not distinguish between short circuit and alarm condition.

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 non-resettable line-type heat detectors to this European Standard.

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

Non-resettable line-type heat detectors with special characteristics and developed for specific risks are not covered by this standard.

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 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 60068-1:2014, *Environmental testing - Part 1: General and guidance (IEC 60068-1:2013)*

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 60068-2-78:2013, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state (IEC 60068-2-78:2012)*

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
digital detector
detectors, the sensing element of which can be either of two states: standby or alarm

Note 1 to entry: In this type of detector the alarm threshold is inherent to the construction of the sensing element.

3.1.2
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.

3.1.3
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).

3.1.4
non-resettable line-type heat detectors
NLTHD
detector which responds to heat sensed in the vicinity of a continuous line, and which can only respond once

Note 1 to entry: A non-resettable line-type heat detector may consist of a sensor control unit, a sensing element and functional units.

3.1.5
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.

Note 2 to entry: The sensing element may be connected directly to control and indicating equipment approved to EN 54–2, an input/output device approved to EN 54–18 or via a dedicated sensor control unit (see 3.1.6).

3.1.6
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 applies.

NLTHD: non-resettable line-type heat detector

4 Product characteristics

4.1 General

4.1.1 Compliance

In order to comply with the present standard, detectors NLTHD shall comply with the requirements 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 NLTHD performance type

To simplify/standardize/rationalize product marking (see Clause 8), the performance type of the NLTHD is described using the following format, Txxx-Vyy-Azzz, where:

— Txxx is the nominal alarm temperature in the range 54 °C to 160 °C;

— Vyy is the variance of the nominal alarm temperature in ± %, which is either 05 or 10;

— Azzz is the maximum ambient temperature in °C, i.e. the maximum environment temperature at which the sensing element of the NLTHD could be installed and operated without generating an alarm.

EXAMPLE T085-V10-A066 means a NLTHD with a nominal alarm temperature of 85 °C having a variance of 10 % (i.e. a minimum alarm temperature of 76,5 °C and a maximum alarm temperature of 93,5 °C) which can be used for an application in which the ambient temperature is no greater than 66 °C.

The difference between the maximum ambient temperature and the minimum alarm temperature is to be at least 4°C.

4.1.3 Environmental groups

Different environmental groups are necessary to reflect the different service environment of the components of an NLTHD:

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 outdoors.

4.2 Nominal activation conditions/sensitivity

4.2.1 Individual alarm indication

Each sensor control unit shall be provided with an integral latched red visual indicator, by which the individual sensor control unit, which released an alarm, 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 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 NLTHD 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.

4.3 Operational reliability

4.3.1 Maximum ambient temperature

The sensing element of the NLTHD shall be capable of withstanding long term exposure to temperatures as specified in 5.3.1.

4.3.2 Connection of ancillary devices

Where the NLTHD 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 NLTHD.

Where such connections are present the detector shall be assessed in accordance with 5.3.2.

4.3.3 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 5.3.3.

4.3.4 Software controlled detectors

4.3.4.1 General

For NLTHD, which rely on software control in order to fulfil the requirements of this standard, the requirements of 4.3.4.2, 4.3.4.3 and 4.3.4.4 shall be met.

4.3.4.2 Software documentation

4.3.4.2.1 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.

4.3.4.2.2 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).

4.3.4.3 Software design

In order to ensure the reliability of the NLTHD, 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.

4.3.4.4 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 NLTHD.

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 5.3.4.

4.3.5 Sensing element fault

The NLTHD shall signal a fault condition when the sensing element is interrupted.

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

4.3.6 On-site adjustment of response behaviour

The effective response behaviour of a NLTHD is dependent upon both the sensitivity settings of the sensor control unit and the heat sensing element. Some types of NLTHD therefore may have facilities to adjust the sensitivity of the NLTHD 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.

These adjustments may 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 5.3.6.

4.4 Tolerance to supply voltage

4.4.1 Variation in supply parameters

The NLTHD 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 NLTHD 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 condition

The response temperature of the tested NLTHD's shall be within the manufacturer's performance type declaration as specified in 5.5.

4.6 Durability of Performance parameters under fire condition

4.6.1 Temperature resistance

4.6.1.1 Dry heat (operational) for sensor control unit

The sensor control unit of the NLTHD shall function correctly at high ambient temperatures as specified in 5.6.1.1.

4.6.1.2 Cold (operational) for sensing element

The sensing element of the NLTHD shall function correctly at low ambient temperatures as specified in 5.6.1.2.

4.6.1.3 Cold (operational) for sensor control unit

The sensor control unit of the NLTHD shall function correctly at low ambient temperatures as specified in 5.6.1.3.

4.6.2 Humidity resistance

4.6.2.1 Damp heat, steady-state (endurance) for sensor control unit and sensing element

The NLTHD shall be capable of withstanding long term exposure to a high level of continuous humidity as specified in 5.6.2.1.

4.6.2.2 Damp heat, cyclic (operational) for sensing element

The sensing element of the NLTHD shall function correctly at high relative humidity (with condensation) as specified in 5.6.2.2.

4.6.2.3 Damp heat, cyclic (operational) for sensor control unit

The sensor control unit of the NLTHD shall function correctly at high relative humidity (with condensation) as specified in 5.6.2.3.

4.6.2.4 Damp heat, steady-state (operational) for sensor control unit

The sensor control unit of the NLTHD shall function correctly high relative humidity (without condensation) as specified in 5.6.2.4.

4.6.2.5 Damp heat, cyclic (endurance) for sensor control unit and sensing element

The NLTHD shall be capable of withstanding the long term effect of cyclic high humidity levels (with condensation) as specified in 5.6.2.5.

4.6.3 Shock and vibration resistance

4.6.3.1 Shock (operational) for sensor control unit

The sensor control unit of the NLTHD shall function correctly when submitted to mechanical shocks which are likely to occur in the service environment as specified in 5.6.3.1.

4.6.3.2 Impact (operational) for sensor control unit

The sensor control unit of the NLTHD shall operate correctly when submitted to mechanical impacts as specified in 5.6.3.2.

4.6.3.3 Impact (operational) for sensing element

The sensing element of the NLTHD shall operate correctly when submitted to mechanical impacts as specified in 5.6.3.3.

4.6.3.4 Vibration, sinusoidal (operational) for sensor control unit

The sensor control unit of the NLTHD shall operate correctly when submitted to sinusoidal vibration as specified in 5.6.3.4.

4.6.3.5 Vibration, sinusoidal (operational) for sensing element

The sensing element of the NLTHD shall operate correctly when submitted to sinusoidal vibration as specified in 5.6.3.5.