SLOVENSKI STANDARD
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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 en ligne non-réenclenchables

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

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 72.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Foreword

This document (prEN 54-28:2011) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarm systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive, 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

Part 27: Duct smoke 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 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.

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 fire brigade. 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 classified 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 (digital) line type heat detectors consisting of a sensing element using an electrical sensor cable connected to a sensor control unit, 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.

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

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.

This European Standard specifies the requirements and performance criteria, the corresponding test methods and the evaluation of conformity of the product to the standard.

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.

EN 54-1:1996, *Fire detection and fire alarm systems — Part 1: Introduction*

EN 54-2:1997, *Fire detection and fire alarm systems — Part 2: Control and indicating equipment*
EN 54-2:1997/A1:2006, *Fire detection and fire alarm systems — Part 2: Control and indicating equipment*

EN 54-4:1997, *Fire detection and fire alarm systems — Part 4: Power supply equipment*
EN 54-4:1997/A1:2002, *Fire detection and fire alarm systems — Part 4: Power supply equipment*
EN 54-4:1997/A2:2006, *Fire detection and fire alarm systems — Part 4: Power supply equipment*

EN 54-5:2000; *Fire detection and fire alarm systems — Part 5: Point-type heat detectors*
EN 54-5:2000/A1:2002; *Fire detection and fire alarm systems — Part 5: Point-type heat detectors*

EN 54-7:2000; *Fire detection and fire alarm systems — Part 7: Point-type smoke detectors*
EN 54-7:2000/A1:2002; *Fire detection and fire alarm systems — Part 7: Point-type smoke detectors*
EN 54-7:2000/A2:2006; *Fire detection and fire alarm systems — Part 7: Point-type smoke detectors*

EN 50130-4:1995, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: immunity requirements for components of fire, intruder and social alarm systems*
EN 50130-4/A1:1998, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: immunity requirements for components of fire, intruder and social alarm systems*
EN 50130-4/A2:2003, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: immunity requirements for components of fire, intruder and social alarm systems*

EN 60068-1:1994, *Environmental testing — Part 1: General and guidance*

EN 60068-2-1:2007, *Environmental testing — Part 2-1: Tests; Tests A: cold*

EN 60068-2-2:1993 +A1:1993, *Environmental testing — Part 2: Tests; Test B: dry heat*

EN 60068-2-27:1993, *Environmental testing — Part 2-27: Tests, Test Ea: shock*

EN 60068-2-30:2005, *Environmental testing — Part 2-30: Variant 1 test cycle and controlled recovery conditions: Damp heat, cyclic*

EN 60068-2-42:2003, *Environmental testing — Part 2-42: Tests, Test Kc: Sulphur dioxide, steady state*

EN 60068-2-6:1995, *Environmental testing — Part 2: Tests - Test Fc: Vibration, sinusoidal*

EN 60068-2-75:1997, *Environmental testing — Part 2-75: Tests, Test Eh for test Ehb: impact*

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

3 Terms, definitions and abbreviations

For the purposes of this document the terms and definitions given in EN 54-1:1996 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 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
linear 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 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).

3.1.6
non-resettable line type heat detectors
NLTHD
a LTHD which can only respond once

3.1.7
resettable line type heat detectors
RLTHD
a LTHD which is able to return to its quiescent condition after a response

3.1.8
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.

3.1.9
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 A sensing element may consist of different segments separated e.g. by functional units or splices.

NOTE 2 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 3.1.10).

3.1.10
sensor control unit
unit that supervises the sensing element and communicates to the control and indicating equipment

NOTE The unit can be remote or an integral part of the control and indicating equipment as defined by EN 54-2.

4 Requirements

4.1 General

4.1.1 Compliance

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

4.1.2 Performance type declaration

The manufacturer shall declare the performance type of the NLTHD to be tested using the following format: Txxx-Vyy-Azzz where:

— Txxx equals the nominal alarm temperature in °C which shall be in the range 54°C to 160°C;

— Vyy equals the variance of the nominal alarm temperature in %, which shall only be 05 or 10;

— Azzz equals 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 non-resettable line type heat detector 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 shall 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 a line type heat detector:

The sensing element shall be classified either environmental group II or III.

The sensor control unit and the functional unit shall be classified 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 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.

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.

4.3 Operational reliability

4.3.1 Maximum ambient temperature test (endurance) for sensing element

The sensing element of the non-resettable line type heat detector shall be capable of withstanding long term exposure to temperatures as specified in 5.2.1.

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.

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).

4.3.4 Requirements for 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.

4.3.5 Sensing element fault

The following fault condition test methods apply:

a) Sensing element faults (see 5.2.2);

b) Low voltage (see 5.3.2)

4.3.6 On-site adjustment of 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.

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

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 5.3.1

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 5.3.2

4.5 Performance parameters under fire condition

4.5.1 Performance and reproducibility

The response temperature of the tested NLTHD's shall be within the manufacturer's performance type declaration as specified in 5.3.3.

4.5.2 Marking

4.5.3 General

Where any marking on the NLTHD uses symbols or abbreviations not in common use then these shall be explained in the data supplied with the NLTHD.

The marking shall be visible during installation and shall be accessible during maintenance.

The markings shall not be placed on easily removable parts like screws.

NOTE Where Annex ZA.3 requires the CE marking to be accompanied by the same information as required by this clause, the requirements of this clause are met

4.5.3.1 Marking of sensor control unit

The sensor control unit shall be clearly marked with the following information:

a) the number and date of this standard;(i.e. EN 54-28:2012)

b) environment classification (Group I, II or III);

c) the name or trademark of the manufacturer or supplier;

d) the model designation (type or number);

e) the wiring terminal designations;

f) some mark(s) or code(s) (e.g. serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software, contained within the sensor control unit.

4.5.3.2 Marking of sensing element

Each sensing element shall be marked with the following information:

a) the number and date of this standard;(i.e. EN 54-28:2012)

b) the performance type of the NLTHD (e.g. T085-V10-A066);

c) name or trademark of the manufacturer or supplier;

d) model designation (type or number);

e) environment classification (Group II or III);

f) some mark(s) or code(s) (e.g. serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software, contained within the sensing element, if applicable.

NOTE If it is not possible to mark directly on the sensing element then the use of at least one label securely fixed to the sensing element is permitted.

4.5.3.3 Marking of functional units

Each functional unit shall be marked with the following information:

a) the number and date of this standard (i.e. EN 54-28:2012);

b) name or trademark of the manufacturer or supplier;

c) model designation (type or number);

d) environment classification (Group I, II or III);

e) the wiring terminal designations;

f) some mark(s) or code(s) (e.g. serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software, contained within the functional unit.

4.5.4 Data

NLTHD shall either be supplied with sufficient technical, installation and maintenance data to enable their correct installation and operation or, if all of these data are not supplied with each detector, reference to the appropriate data sheet shall be given with each NLTHD.

To understand correct operation of the detectors, additional data shall be available that describe the processing of the signals from the detector. This may be in the form of a full technical specification of these signals, a reference to the appropriate signalling protocol or a reference to suitable types of sensor control unit and/or control and indicating equipment, etc.

Installation and maintenance data shall include an in situ test method to ensure that detectors operate correctly when installed.

NOTE Additional information could be required by organisations certifying that detectors produced by a manufacturer conform to the requirements of this standard.

4.6 Durability

4.6.1 Temperature resistance

4.6.1.1 Dry heat (operational) sensor control unit

The sensor control unit of the NLTHD shall function correctly at high ambient temperatures as specified in 5.5.1.

4.6.1.2 Cold (operational) sensing element

The sensing element of the NLTHD shall function correctly at low ambient temperatures as specified in 5.5.2.

4.6.1.3 Cold (operational) sensor control unit

The sensor control unit of the NLTHD shall function correctly at low ambient temperatures as specified in 5.5.3