



# SLOVENSKI STANDARD

## SIST EN 54-27:2015

01-maj-2015

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### Sistemi za odkrivanje in javljanje požara ter alarmiranje - 27. del: Dimni javljalnik za prezračevalne kanale

Fire detection and fire alarms systems - Part 27: Duct smoke detectors

Brandmeldeanlagen - Teil 27: Rauchmelder für die Überwachung von Lüftungsleitungen

Systèmes de détection et d'alarme incendie - Partie 27 : Détecteurs de fumées dans les conduits

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Ta slovenski standard je istoveten z: <sup>SIST EN 54-27:2015</sup> EN 54-27:2015

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| 13.220.20 | Požarna zaščita               | Fire protection           |
| 13.320    | Alarmni in opozorilni sistemi | Alarm and warning systems |

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EUROPEAN STANDARD

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**Fire detection and fire alarms systems - Part 27: Duct smoke detectors**Systèmes de détection et d'alarme incendie - Partie 27 :  
DéTECTEURS DE FUMÉES DANS LES CONDUITSBrandmeldeanlagen - Teil 27: Rauchmelder für die  
Überwachung von Lüftungsleitungen

This European Standard was approved by CEN on 11 January 2015.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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## Foreword

This document (EN 54-27:2015) 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of an identical text or by endorsement, at the latest by September 2015 and conflicting national standards shall be withdrawn at the latest by March 2019.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 basic requirements of EU Regulation 305/2011.

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

Information on the relationship between this European Standard and other standards of the EN 54 series is given in EN 54-1.

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 detector — Point detectors;*
- *Part 11: Manual call points;*
- *Part 12: Smoke detectors — Line detectors using an optical light beam;*
- *Part 13: Compatibility assessment of system components;*
- *Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance [CEN Technical specification];*
- *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;*

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- *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: Point fire detectors using carbon monoxide sensors;*
- *Part 27: Duct smoke detectors [the present document];*
- *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.*

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](http://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.

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## Introduction

Duct smoke detectors (DSD) are used as part of a fire detection and fire alarm system or as a stand-alone actuator for a fire protection system to sample the air within air ducts of a building. Detection of smoke can be used as a signal to the connected control and indicating equipment and can be used as a signal to an air-handling system to prevent the spread of smoke within the building.

A DSD is required to function satisfactorily not only in the event of a fire, but also in the conditions likely to be met in practice such as corrosion, vibration, direct impact, indirect shock and electromagnetic interference. Some tests specified are intended to assess the performance of the DSD under such conditions.

The performance of DSD is assessed from results obtained in specific tests. This document is not intended to place any other restrictions on the design and construction of such equipment.

An example for a stand-alone system is given in Figure K.1. The configuration of a fire detection and fire alarm system is given in EN 54-1.

Annex L gives information on power supply. These requirements are system requirements or requirements on other components respectively and do not concern the product requirements of the DSD.

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**EN 54-27:2015 (E)****1 Scope**

This European Standard specifies requirements, test methods and performance criteria for fire detectors which detect smoke in air ducts in buildings as a part of a fire detection and fire alarm system or as an actuator for a fire protection system.

Duct smoke detectors with special characteristics and developed for specific risks are not covered by this document.

NOTE Certain types of detector contain radioactive materials. The national requirements for radiation protection differ from one member state to another and are not specified in 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 54-7:2000,<sup>1)</sup> *Fire detection and fire alarm systems - Part 7: Smoke detectors - Point detectors using scattered light, transmitted light or ionization*

EN 54-13:2005, *Fire detection and fire alarm systems - Part 13: Compatibility assessment of system components*

EN 54-20:2006,<sup>2)</sup> *Fire detection and fire alarm systems - Part 20: Aspirating smoke detectors*  
[https://standards.iteh.ai/catalog/standards/sist/dc809a09-7bff-4b27-aebb-](https://standards.iteh.ai/catalog/standards/sist/dc809a09-7bff-4b27-aebb-71d17a6661ee/en-54-27:2015)

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 60068-1:1988)*

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 60068-2-6:2008, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)(IEC 60068-2-6:2007)*

EN 60068-2-27:2009, *Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock (IEC 60068-2-27:2008)*

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 60068-2-75:2014, *Environmental testing - Part 2-75: Tests - Test Eh: Hammer tests (IEC 60068-2-75:2014)*

1) EN 54-7:2000 is currently impacted by the stand-alone amendments EN 54-7:2000/A1:2002 and EN 54-7:2000/A2:2006.

2) EN 54-20:2006 is currently impacted by the corrigendum EN 54-20:2006/AC:2008.

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

### 3 Terms, abbreviated terms and definitions

#### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 54-1:2011, EN 54-13:2005 and the following apply.

##### 3.1.1

##### **duct smoke detector**

fire detector that monitors the air in an air duct to detect smoke

Note 1 to entry: The combination with additional sensors for different fire phenomena is possible.

##### 3.1.2

##### **response threshold value**

aerosol concentration within the duct in the proximity of the specimen at the moment that it generates an alarm signal

Note 1 to entry: The response threshold value can depend on signal processing in the detector and in the control and indicating equipment.

##### 3.1.3

##### **type 1 DSD**

point smoke detector mounted inside the duct

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##### 3.1.4

##### **type 2 DSD**

point smoke detector mounted inside the duct with additional electrical components

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Note 1 to entry: Additional electrical components, e.g. visual indicators are not covered by EN 54 standards. Their functions are described e.g. in 4.2.1, 4.2.2, and 4.2.3.

##### 3.1.5

##### **type 3 DSD**

point smoke detector mounted outside the duct with additional mechanical means to sample the air

##### 3.1.6

##### **type 4 DSD**

point smoke detector mounted outside the duct with additional mechanical means to sample the air and with additional electrical components

Note 1 to entry: Additional electrical components, e.g. visual indicators are not covered by EN 54 standards. Their functions are described e.g. in 4.2.1, 4.2.2, and 4.2.3.

##### 3.1.7

##### **type 5 DSD**

aspirating smoke detector with all sampling points inside the duct

##### 3.1.8

##### **type 6 DSD**

other types of DSD not complying with type 1 to type 5

Note 1 to entry: This type 6 DSD includes detectors based on EN 54-7 or EN 54-20 with modified sensitivity settings.

**EN 54-27:2015 (E)****3.2 Abbreviated terms**

|      |                                      |
|------|--------------------------------------|
| ASD  | Aspirating smoke detector            |
| CIE  | Control and indicating equipment     |
| DSD  | Duct smoke detector                  |
| FDAS | Fire detection and fire alarm system |
| FPC  | Factory production control           |
| FPS  | Fire protection system               |

**4 Requirements****4.1 General**

**4.1.1** Duct smoke detectors shall incorporate at least one smoke sensor. The combination with additional sensors for different fire phenomena can be used.

If additional fire sensors for different fire phenomena are implemented in a DSD, these sensors shall be approved in accordance with the corresponding EN 54 standards.

The manufacturer shall specify whether the DSD can directly be used as an actuator for fire protection systems, i.e. stand-alone system or as a part of a FDAS.

The requirements of this clause shall be applied for all six types of DSD. The relevant tests for the different types of DSD are described in Clause 5.

For type 1 DSD to type 4 DSD, the point smoke detector shall be approved to EN 54-7. Otherwise the DSD shall be assessed like a type 6 DSD.

For type 5 DSD, the ASD shall be approved to EN 54-20; otherwise the DSD shall be assessed like a type 6 DSD.

**4.1.2 Compliance:**

To comply with this standard the DSD shall meet the requirements of Clause 4 which shall be verified by visual inspection or engineering assessment and shall be tested as described in Clause 5 and shall meet the requirements of the tests.

**4.2 Nominal activation conditions/sensitivity****4.2.1 Individual alarm indication**

Each DSD shall be provided with a red visual indicator, by which the DSD can be identified when the associated detector releases an alarm, until the alarm condition is reset manually. Where other conditions of the DSD can be visually indicated, they shall be clearly distinguishable from the alarm indication, except when the DSD is switched into a service mode. The visual indicator shall be visible from outside of the duct from a distance of 6 m in an ambient light intensity up to 500 lx in at least one direction from the DSD. The visual indicator may be integral part of the DSD or remote from DSD.

**4.2.2 Additional visual indication (option with requirement)**

If the DSD is used as an actuator for a FPS, i.e. stand-alone system then the DSD shall be provided with additional indicators yellow for "fault" and green for "power on". Additional indicators may be integral part of the DSD or remote from DSD.

For operated DSD the additional visual indicator shall be visible from outside of the duct from a distance of 6 m in an ambient light intensity up to 500 lx in at least one direction from the DSD.

#### 4.2.3 Alarm resetting for stand-alone systems (option with requirement)

If the DSD is used as an actuator for a FPS, i.e. stand-alone system then the DSD shall be provided with means for manual resetting. Means for resetting may be integral part of the DSD or remote from DSD.

#### 4.2.4 Connection of ancillary devices (option with requirement)

For all connections to ancillary devices (remote indicators, control relays etc.), open- or short-circuit failures of these connections shall not prevent the correct operation of the DSD.

Where such connections are present the detector shall be assessed in accordance with 5.2.4.

#### 4.2.5 Response to slowly developing fires

For type 1 DSD to type 5 DSD the requirements as given in EN 54-7 and EN 54-20 respectively shall be applied. For type 6 DSD the manufacturer shall specify with which of these European Standards the DSD complies.

#### 4.2.6 Dazzling

The sensitivity of the DSD shall not be unduly influenced by the close proximity of artificial light sources. To confirm this, the detector shall be assessed in accordance with 5.2.6. This test is only applicable to detectors using optical smoke sensors, as ionization chamber detectors are considered unlikely to be influenced.

### 4.3 Operational reliability

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#### 4.3.1 Repeatability

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The detector shall have stable behaviour with respect to its sensitivity to smoke after a number of alarm conditions. To confirm this, the detector shall be assessed in accordance with 5.3.1.

#### 4.3.2 Reproducibility

The sensitivity of the detector to smoke shall not vary unduly from specimen to specimen. To confirm this, the detector shall be assessed in accordance with 5.3.2.

#### 4.3.3 On-site adjustment of response behaviour

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

- 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 or by removing the detector from its base or mounting;
- 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.

**EN 54-27:2015 (E)****4.3.4 Manufacturer's adjustments**

The DSD shall be designed so that the manufacturer's settings can only be changed by special means (e.g. the use of a special code or tool) or by breaking or removing a seal.

**4.3.5 Monitoring of detachable detectors**

For detachable detectors, means shall be provided to detect the removal of the head from the base, in order to give a fault signal.

**4.3.6 Software controlled detectors (when provided)****4.3.6.1 General**

DSD which rely on software control shall meet the requirements of 4.3.6.2, 4.3.6.3 and 4.3.6.4.

**4.3.6.2 Software documentation**

The manufacturer shall submit documentation to the test laboratory which gives an overview of the software design. This documentation shall be in sufficient detail for the design to be inspected for compliance with this standard and shall include at least the following:

- 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 of the detector;
  - 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.

**4.3.6.3 Design detail**

The manufacturer shall have available detailed design documentation, which only needs to be provided if required by the testing authority. 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 etc.).

#### 4.3.6.4 Software design

In order to ensure the reliability of the DSD, 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.

#### 4.3.6.5 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. Areas of memory containing this program and data shall be designed such that they can only be written to by the use of some special tool or code and not during normal operation of the detector.

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

### 4.4 Tolerance to supply voltage — Variation in supply parameters

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

### 4.5 Performance parameters under fire conditions — Fire sensitivity

The DSD shall have adequate sensitivity to incipient type fires that may occur in buildings. To confirm this, the DSD shall be assessed in accordance with 5.5.1.

### 4.6 Durability of Nominal activation conditions/sensitivity

#### 4.6.1 Temperature resistance

##### 4.6.1.1 Dry heat (operational)

The DSD shall function correctly at high ambient temperatures. To confirm this, the detector shall be assessed in accordance with 5.6.1.1.

##### 4.6.1.2 Cold (operational)

The DSD shall function correctly at low ambient temperatures. To confirm this, the detector shall be assessed in accordance with 5.6.1.2.