SLOVENSKI STANDARD
SIST EN 54-20:2006

01-november-2006

Sistemi za odkrivanje in javljanje požara ter alarmiranje - 20. del: Aspiracijski dimni javljalniki

Fire detection and fire alarm systems - Part 20: Aspirating smoke detectors

Brandmeldeanlagen - Teil 20: Ansaugrauchmelder

Systemes de détection et d'alarme incendie - Partie 20 : Détecteurs de fumée par aspiration

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN 54-20:2006**

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6320c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

ICS:

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

SIST EN 54-20:2006 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST EN 54-20:2006

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

SIST EN 54-20:2006

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 54-20

June 2006

ICS 13.220.20

English Version

Fire detection and fire alarm systems - Part 20: Aspirating smoke detectors

Systèmes de détection et d'alarme incendie - Partie 20 : Détecteurs de fumée par aspiration

Brandmeldeanlagen - Teil 20: Ansaugrauchmelder

This European Standard was approved by CEN on 18 May 2006.

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 Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2006 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 54-20:2006: E

SIST EN 54-20:2006

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

SIST EN 54-20:2006

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

SIST EN 54-20:2006

Foreword

This document (EN 54-20:2006) 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 December 2006, and conflicting national standards shall be withdrawn at the latest by June 2009.

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(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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Part 5: Heat detectors - Point detectors

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

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e7205f56ba327/sist-en-54-20-2006

Part 10: Flame detectors - 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

Part 15: Point detectors using a combination of detected fire 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: Line-type heat detectors

Part 23: Fire alarm devices - Visual alarms

Part 24: Components of voice alarm systems – Loudspeakers

SIST EN 54-20:2006

Part 25: Components using radio links and system requirements

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

SIST EN 54-20:2006

1 Scope

This European Standard specifies the requirements, test methods and performance criteria for aspirating smoke detectors for use in fire detection and fire alarm systems installed in buildings.

Aspirating smoke detectors developed for the protection of specific risks that incorporate special characteristics (including additional features or enhanced functionality for which this standard does not define a test or assessment method) are not covered by this standard. The performance requirements for any special characteristics are beyond the scope of this standard.

NOTE Certain types of detector contain radioactive materials. The national requirements for radiation protection differ from country to country and they are not therefore specified in this 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, *Fire detection and fire alarm systems – Part 2: Control and indicating equipment*

EN 54-4, *Fire detection and fire alarm systems – Part 4: Power supply equipment*

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006

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

EN 50130-4:1995, *Alarm systems – Part 4: Electromagnetic compatibility – Product family standard: Immunity requirements for components of fire, intruder and social alarm systems*

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

EN 60068-2-1, *Environmental testing; part 2: tests; tests A: cold (IEC 60068-2-1:1990)*

EN 60068-2-2, *Basic environmental testing procedures; part 2: tests; tests B: dry heat (IEC 60068-2-2:1974 + IEC 60068-2-2A:1976)*

EN 60068-2-6, *Environmental testing - Part 2: Tests - Tests Fc: Vibration (sinusoidal) (IEC 60068-2-6:1995 + Corrigendum 1995)*

EN 60068-2-27, *Basic environmental testing procedures – Part 2: Tests – Test Ea and guidance: Shock (IEC 60068-2-27:1987)*

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

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

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

EN 61386-1:2004, *Conduit systems for electrical installations - Part 1: General requirements (IEC 61386-1:1996 + A1:2000)*

SIST EN 54-20:2006

3 Terms and definitions

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

3.1
aspirating smoke detector
smoke detector, in which air and aerosols are drawn through a sampling device and carried to one or more smoke sensing elements by an integral aspirator (e.g. fan or pump)

NOTE Each smoke sensing element may contain more than one sensor exposed to the same smoke sample.

3.2
sampling device
component or series of components or dedicated device (e.g. a pipe network, dedicated duct, probe or hood) which forms part of the ASD and transfers samples of air to the smoke sensing element(s)

NOTE The sampling device may be supplied separately.

3.3
sampling point
any point at which an air sample is drawn into the sampling device

3.4
response threshold value (RTV)
measure of the aerosol concentration in the proximity of the smoke sensing element at the moment that the specimen generates an alarm signal, when it is tested as described in 6.1.5

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.5
transport time
time for aerosols to transfer from a sampling point to the smoke sensing element

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/26520c0-6c8-4205-a94-e763956ba327/sist-en-54-20-2006

3.6
recovery
treatment of a specimen, after conditioning, so that the properties of the specimen may be stabilized before measurement of the said property as required by this standard

4 Symbols and abbreviations

For the purposes of this standard, the following abbreviations apply:

ASD: Aspirating smoke detector.

CIE: Control and indicating equipment.

CPC: Condensation particle counter.

DUT: Detector under test.

EEA: European Economic Area.

EMC: Electromagnetic compatibility.

EOT: End of test.

FPC: Factory production control.

SIST EN 54-20:2006

MIC: Measuring ionization chamber.

RTV: Response threshold value.

5 Requirements

5.1 Compliance

To comply with this standard the detector shall meet the requirements of this clause, which shall be verified by inspection and engineering assessment, and, when tested in accordance with the tests described in Clause 6, shall meet the requirements of the tests.

5.2 Individual visual alarm indication

Each aspirating smoke detector shall be provided with integral red visual indicator(s), visible from outside the aspirating smoke detector, by which the individual smoke sensing element(s) (see 3.1), which released an alarm, can be identified, until the alarm condition is reset. Where other conditions of the detector may be visually indicated, they shall be clearly distinguishable from the alarm indication.

5.3 Connection of ancillary devices

The detector may provide for connections to ancillary devices (e.g. remote indicators, control relays), but open- or short-circuit failures of these connections shall not prevent the correct operation of the detector.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5.4 Manufacturer's adjustments

SIST EN 54-20:2006

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

5.5 On site adjustment of response behaviour

NOTE 1 The effective response behaviour of an aspirating smoke detector is dependent upon both the sensitivity settings of the smoke sensing element and the design of the sampling device. Many types of aspirating smoke detectors therefore have facilities to adjust the smoke sensing element sensitivity to suit the application and sampling device etc.

If there is provision for field-adjustment of the sensitivity of the smoke sensing element then:

a) access to the means of adjustment shall be limited by the need for the use of tools or a special code;

b) it shall be possible to determine what sensitivity settings have been selected and to relate these to documentation which describes the sensitivity settings required for different sampling devices and applications;

NOTE 2 These adjustments may be made at the detector or at the control and indicating equipment.

NOTE 3 Changing sensitivity settings may affect the classification of the installed ASD – see Clause 7.

c) if it is possible to configure the detector (including the sampling device and the sensitivity settings) in such a way that the detector does not comply with this standard, it shall be clearly marked on the detector or in the associated data that, if such configurations are used, the detector does not comply with this standard.

SIST EN 54-20:2006

5.6 Response to slowly developing fires

The provision of "drift compensation" (e.g. to compensate for sensor drift due to the build up of dirt in the detector), and/or the provision of algorithms to match a detector to its environment, shall not lead to a significant reduction in the detector's sensitivity to slowly developing fires.

Because it is not practical to make tests with very slow increases in smoke density, an assessment of the detector's response to slow increases in smoke density shall be made by analysis of the circuit/software, and/or physical tests and simulations.

Where such algorithms are used, the detector shall be deemed to meet the requirements of this sub-clause if the documentation and assessment shows:

a) how and why a sensor drifts,

b) how the compensation technique modifies the detector response to compensate for the drift,

c) that suitable limits to the compensation are in place to prevent the algorithms/means being applied outside the known limitations of the sensor and to ensure ongoing compliance with the clauses of this standard,

d) for any rate of increase in smoke density R, which is greater than A/4 per hour (where A is the detector's initial uncompensated response threshold value), the time for the detector to give an alarm does not exceed $1,6 \times A/R$ by more than 100 s,

e) the range of compensation is limited such that, throughout this range, the compensation does not cause the response threshold value of the detector to exceed its initial value by a factor greater than 1,6.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

NOTE Further information about the assessment of requirements d) and e) is given in Annex J.

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e7d3f56ba327/sist-en-54-20-2006

5.7 Mechanical strength of the pipework

The sampling pipes and fittings shall have adequate mechanical strength and temperature resistance.

The minimum requirement shall be:

To use pipes classified in accordance with EN 61386-1 to at least Class 1131 (for the first four digits, see Table 1).

SIST EN 54-20:2006

Table 1 — Mechanical requirements of sampling pipe

Property	**Class**	**Severity**
Resistance to compression	1	125 N
Resistance to impact	1	0,5 kg, 100 mm height to fall
Temperature range	31	-15 °°C to +60 °C

Pipes which are not so classified by the manufacturer of the pipe shall either be tested in accordance with Table 2 for the classes in Table 1, or the ASD manufacturer shall provide evidence that the requirements of this sub-clause are met.

Table 2 — Mechanical tests

Test	**EN 61386-1:2004, subclause**
Compression test	10.2
Impact test	10.3
Resistance to heat	12.2

The impact test shall be conducted at the minimum of the temperature range (i.e. -15 °C).

The pipe is deemed to have passed the resistance to heat test if any crushing of the pipe does not reduce the internal diameter to less than 80 % of its original value.

Where the supplier of the ASD does not supply pipe for the sampling device, the product documentation shall specify that the requirements of this sub-clause shall be met.

NOTE An example of suitable evidence that the pipe meets this requirement is a test report, approval certificate or a declaration of conformity from the manufacturers of the pipe, even though it is not marked in accordance with EN 61386-1.

5.8 Hardware components and additional sensing elements in the sampling device

Components, including optional components (box, filter, sensor, valve etc.) in the sampling device shall be described in the documentation. The ASD, including the hardware components listed (i.e. the worst case combination in accordance with the manufacturer's documentation), shall meet the requirements of this standard.

If the component incorporates a sensing element which participates in the signal output of the ASD (e.g. for localisation information) then the performance of the ASD, including these sensing elements, shall meet the requirements of this standard.

5.9 Airflow monitoring

5.9.1 A fault signal shall be given when the airflow is outside the operational limits as specified by the manufacturer in his data.

5.9.2 The airflow through the aspirating smoke detector shall be monitored to detect leakage or obstruction of the sampling device or sampling point(s).

Either a fault signal shall be given when any leakage or obstruction results in an increase or decrease in the volumetric airflow of 20 % and greater through the aspirating smoke detector, or where the aspirating smoke detector incorporates technology which provides for constant (or near constant)

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006
e763956ba327/sist-en-54-20-2006

SIST EN 54-20:2006

volumetric flow rate, which is largely independent of the sampling device (e.g. incorporates speed control of the fan or uses a positive displacement pump), then a fault signal shall be given when there is a loss of 50 % and greater of sampling points.

In both cases a period of 300 s is allowed between the fault being applied and the fault signal being given.

NOTE This time is independent of any delay times between signalling the fault and its indication at the CIE and is to allow for spurious short term flow variations which would otherwise result in unwanted fault signals.

5.9.3 Where an aspirating smoke detector has a facility to memorize the “normal” flow (present when the detector is installed or serviced) and thereafter monitor for deviations from this normal flow, the action of setting the memorized “normal” flow shall be a voluntary action under level 3 access (as defined in EN 54-2).

5.9.4 Power cycling the aspirating smoke detector (turning it off and on) shall not result in a change to the memorized normal flow.

5.10 Power supply

The power for the aspirating detector shall be supplied by a power supply complying with EN 54-4.

NOTE This power supply may be common to the control and indicating equipment.

5.11 Data

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Aspirating smoke detectors shall either be supplied with sufficient technical, installation and maintenance data to enable their correct installation, sensitivity setting and operation or, if all of these data are not supplied with each ASD then reference to the appropriate data sheet(s) shall be given on, or with, each aspirating smoke detector.

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-c76b9950ba32/sist-en-54-20-2006

The manufacturer shall declare in these data the classification of each sampling device configuration and associated sensitivity settings. If the number of configurations is undetermined, the manufacturer shall provide the necessary means to determine the classification of any used configuration.

These data shall be referred to in the test report to describe and determine the 'worst case' configuration(s) to be used in the fire tests (see 6.15) and the transport time for the sampling point(s) in the fire test room.

NOTE 1 The transport time should not include any processing time and is specifically limited to the time it takes to transport aerosols from the sampling point (in the fire test room) to the sensing element.

The method used for determining the classification shall be clearly stated.

NOTE 2 This is likely to take into account the following parameters:

- sizes and number of sampling points (maximum and minimum) and any limitations on their position along the sampling device,
- sensitivity settings for the detector and how this should be adjusted,
- details of permitted sampling device arrangement (e.g. single pipe, branch, H-configurations),
- maximum length of the sampling device (e.g. the maximum pipe length and branch length),
- aspirator setting (if adjustable).

SIST EN 54-20:2006

5.12 Additional requirements for software controlled detectors

5.12.1 General

For detectors that rely on software control to fulfil the requirements of this standard, the requirements of 5.12.2, 5.12.3 and 5.12.4 shall be met.

5.12.2 Software documentation

5.12.2.1 The manufacturer shall submit documentation to the testing authority 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) functional description of the main program flow (e.g. as a flow diagram or structogram) including:

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

   2) way in which the modules interact,

   3) overall hierarchy of the program,

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

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

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

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 54-20:2006

5.12.2.2 The manufacturer shall also 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) overview of the whole system configuration, including all software and hardware components;

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

   1) name of the module,

   2) description of the tasks performed,

   3) 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 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)

5.12.3 Software design

To ensure the reliability of the detector, the following requirements for software design shall apply:

a) software shall have a modular structure,

SIST EN 54-20:2006

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

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

5.12.4 The storage of programs and data

The program necessary to comply with this European Standard and any pre-set 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 detector.

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.

6 Tests

6.1 General

6.1.1 Atmospheric conditions for tests

Unless otherwise stated in a test procedure, the testing shall be carried out after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing as described in EN 60068-1 as follows:

iTeh STANDARD PREVIEW
(standards.iteh.ai)

a) temperature : (15 to 35) °C;

b) relative humidity : (25 to 75) %;

SIST EN 54-20:2006
https://standards.iteh.ai/catalog/standards/sist/2a6520c0-fec8-4305-a94a-e763956ba327/sist-en-54-20-2006

c) air pressure : (86 to 106) kPa.

If variations in these parameters have a significant effect on a measurement, then such variations shall be kept to a minimum during a series of measurements carried out as part of one test on one specimen.

6.1.2 Operating conditions for tests

If a test method requires a specimen to be operational, then the specimen shall be connected to supply and monitoring equipment with characteristics as required by the manufacturer's data. Unless otherwise specified in the test method, the supply parameters applied to the specimen shall be set within the manufacturer's specified range(s) and shall remain substantially constant throughout the tests. The value chosen for each parameter shall normally be the nominal value, or the mean of the specified range.

Where an aspirating smoke detector has multiple sensitivity settings, the sensitivity of the DUT during all tests in Table 3 (with the exception of the fire sensitivity test in 6.15) shall be set at the highest sensitivity setting used during the fire sensitivity test(s).

NOTE It is not intended that the environmental tests are conducted at all possible sensitivity settings, only at the highest used during the fire sensitivity test. This is particularly relevant where multiple classes and/or multiple configurations are submitted.

To allow the flow monitoring function to be checked as required before, during and/or after environmental tests, the sampling device may be simulated by a simpler sampling device (e.g. stub pipe with appropriate orifice(s)) to providing a typical airflow through the detector.