

**Brand och räddning – Branddetekterings- och
brandlarmsystem –**
Del 20: Aspirerande rökdetektorer

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

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Brandmeldeanlagen - Teil 20: Ansaugrauchmelder

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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of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by June 2009.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

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 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

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.

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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*

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)*

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

3.5

transport time

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

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.

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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.

5.4 Manufacturer's adjustments

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.

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.

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

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).