



SLOVENSKI STANDARD
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Javljalniki dima

Smoke alarm devices

Rauchwarnmelder

Dispositifs d'alarme de fumée

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Ta slovenski standard je istoveten z: prEN 14604

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English Version

Smoke alarm devices

Dispositifs d'alarme de fumée

Rauchwarnmelder

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Foreword

This document (prEN 14604:2012) has been prepared by Technical Committee CEN/TC 72 "Fire detection and fire alarms systems", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14604:2005.

prEN 14604:2012 includes the following significant technical changes with respect to EN 14604:2005:

- 4.2.3: new requirement for connection of external ancillary devices;
- 4.2.15: revised requirements for battery capacity;
- 4.2.16: revised requirements for battery fault warning;
- 4.2.21: new requirements for alarm silence feature;
- 4.2.22: revised requirements for protection against the ingress of foreign bodies;
- 4.2.25.4: revised requirements for marking for smoke alarms with radio link;
- 4.7: new requirements for smoke alarms using radio links have been added;
- 4.10: revised requirement for sulphur dioxide (SO₂) corrosion;
- 4.11.1: new requirements for shock (operational);
- 4.12.1: revised requirements for the electrical safety;
- 4.12.2: updating references for the EMC immunity requirements reference EN 50130-4:2011.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

For relationship with EU Directive 89/106/EEC, see informative Annex ZA, which is an integral part of this document.

1 Scope

This document specifies requirements, test methods, performance criteria, and manufacturer's instructions for smoke alarms that operate using scattered light or transmitted light (Type A- optical) or ionisation (Type B- ionisation), intended for household or similar residential applications.

This document includes additional requirements for smoke alarms which are also suitable for use in leisure accommodation vehicles.

For the testing of other types of smoke alarms, or smoke alarms working on different principles, this document should only be used for guidance. Special features of smoke alarms or special characteristics and developed for specific risks, are not covered by this document.

This document allows, although it does not require, the inclusion within the smoke alarm of facilities for interconnection with other similar smoke alarms and/or accessories, and for alarm silencing. Where such facilities are included, this document specifies applicable requirements.

This document does not cover the requirements for devices intended for incorporation in systems using separate control and indicating equipment.

NOTE Certain types of smoke alarms contain radioactive materials. The national requirements for radiation protection differ from country to country and they are not specified in this document. Such smoke alarms should, however, comply with the applicable national requirements.

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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 573-3, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition and form of products*

EN 573-4, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 4: Forms of products*

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 60065:2002, *Audio, video and similar electronic apparatus — Safety requirements (IEC 60065:2001, modified)*

EN 60065:2002/A1:2006, *Audio, video and similar electronic apparatus — Safety requirements (IEC 60065:2001/A1:2005, modified)*

EN 60068-1:1994, *Environmental testing — Part 1: General and guidance (IEC 60068-1:1988 + Corrigendum 1988 + A1:1992)*

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

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

EN 60950-1:2006, *Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1:2005, modified)*

EN 61672-1:2003, *Electroacoustics — Sound level meters — Part 1: Specifications (IEC 61672-1:2002)*

EN ISO 9001:2000, *Quality management systems — Requirements (ISO 9001:2000)*

ETSI EN 300 220-1, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods*

ETSI EN 300 220-2, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 2: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

alarm condition

condition in which the alarm is giving an audible signal specified by the manufacturer as indicating the existence of a fire

3.2

alarm silence facility

means of temporarily disabling or desensitising a smoke alarm

3.3

detachable

means part can be removed for maintenance or other purposes without damaging either component

3.4

fault condition

condition in which the operation of the smoke alarm is affected by an adverse condition of a component

3.5

fault warning

signal intended to indicate an actual or incipient fault that might prevent the emitting of a fire alarm signal

3.6

inter-connectable smoke alarm

smoke alarm which may be interconnected with other smoke alarms to provide a common alarm

3.7

normal condition

condition in which the smoke alarm is energized but is not giving either a fire alarm signal or a fault warning, although able to give such signals if the occasion arises

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- 3.8 normal power source**
primary source of power intended to supply the smoke alarm, e.g. a battery or mains
- 3.9 response threshold**
smoke concentration at which the smoke alarm changes to its alarm condition
- 3.10 smoke alarm**
device containing all the components necessary for detecting smoke and for giving an audible alarm. This may comprise one or more parts such as a base (socket) and a head (body).
- 3.11 standby power source**
source of power intended to supply the smoke alarm in the event of a failure of the normal power source
- 3.12 Type A – optical**
smoke alarm sensitive to combustion products capable of affecting the absorption or scattering of radiation in the infra-red, visible and/or ultraviolet regions of the electromagnetic spectrum
- 3.13 Type B – ionisation**
smoke alarm sensitive to combustion products capable of affecting ionisation currents within the detector

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4 Requirements**4.1 Compliance**

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In order to comply with this document the smoke alarm shall meet the requirements of this section, and this shall be as specified by visual inspection or engineering assessment, or shall be tested as described in Clause 5 and shall meet the requirements of the tests. For smoke alarms which a manufacturer claims are suitable for leisure accommodation vehicles, the tests in Annex L shall be applied.

4.2 Operational reliability**4.2.1 Individual alarm indicator****4.2.1.1 Non Inter-connectable smoke alarm**

An optional alarm indicator, if fitted, shall be red and shall be separate from the mains-on indicator. This visual indicator may also perform other additional functions but the alarm indication needs to be distinct from any additional functions. The failure of any visual indicator shall not prevent the emitting of a fire alarm signal.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.1.1.

4.2.1.2 Inter-connectable smoke alarm

An alarm indicator for inter-connectable smoke alarms shall be red and shall be separate from the mains-on indicator. This visual indicator may also perform other additional functions but the alarm indication needs to be distinct from any additional functions. The failure of any visual indicator shall not prevent the emitting of a fire alarm signal.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.1.2.

4.2.2 Mains-on and other indicators

A smoke alarm intended to be connected to the AC mains shall be provided with a continuous mains-on indicator to indicate energization of the unit. This indicator shall be coloured green and shall be separate from any other indicators. The failure of any visual indicator shall not prevent the emitting of a fire alarm signal.

If more than one light-emitting indicator is provided on the smoke alarm, the mains-on indicator shall be green, an alarm indicator shall be red, and a fault indicator shall be amber or yellow.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.2.

4.2.3 Connection of external ancillary devices

The smoke alarm may provide for connections to external ancillary devices (e.g. test facility, alarm silence facility, remote indicators, control relays, transmitters) by hard wiring, or by RF or by another means, but open- or short-circuit failure of these connections or disruption of the communication path shall not prevent the correct operation of the smoke alarm.

In addition, if the external ancillary device is required for the essential performance of the smoke alarm then it shall be considered as part of the detector and all environmental and EMC conditions shall be applied. If these features are already provided in the smoke alarm device then the environmental and EMC conditions are not required.

To confirm this, the smoke alarm and its associated ancillary device(s) shall be tested in accordance with 5.2.3.

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4.2.4 Means of calibration

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The manufacturer's means of calibration shall not be readily adjustable, on site, after manufacture.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.4.

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4.2.5 User replaceable components

Except for batteries or fuses, a smoke alarm shall have no user replaceable or serviceable components.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.5.

4.2.6 Normal power source

The power source of the smoke alarm may be internal or external to the smoke alarm housing.

Where the power source is internal to the smoke alarm, the source shall meet the following requirements.

The power source shall operate the smoke alarm as specified in 4.2.15.

A distinctive audible fault signal shall be given before the battery is incapable of operating for alarm purposes (see 4.2.16).

The smoke alarm shall be capable of producing an alarm signal for at least 4 min at the battery voltage at which a fault signal is normally obtained or 30 days of fault signal operation (see 4.2.15).

The internal power source shall be replaceable by the user unless its operating life (see 4.2.15) in the smoke alarm is 10 years or greater.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.6.

prEN 14604:2012 (E)**4.2.7 Standby power source**

For smoke alarms intended for connection to an external power supply, for which an integral back-up/standby power facility is provided, the following requirements shall apply:

- a. primary cell battery back-up: the back-up power supply shall be capable of meeting the requirements of 4.2.15;
- b. rechargeable back-up power sources: the back-up power source shall be capable of supplying the quiescent load of the smoke alarm for a minimum period of 72 h followed by an alarm signal as specified in 5.2.19 for at least 4 min in the event of fire, or in the absence of a fire, a fault warning for at least 24h.

In the absence of suitable test procedures to verify the back-up power source, data concerning the smoke alarm loads and the back-up facility characteristics shall be used to indicate that the above requirements can be met.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.7.

4.2.8 Monitoring of back-up power source

The back-up power source shall be monitored by the smoke alarm for faults. These faults shall include low back-up, open circuit and short circuit failure of the back-up.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.8.

4.2.9 Routine test facility

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A routine test facility shall be provided on all smoke alarms to simulate either mechanically or electrically the presence of smoke in the sensing assembly. The test feature shall be accessible from outside the smoke alarm when installed as specified in the installation instructions.

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To confirm this, the smoke alarm shall be tested in accordance with 5.2.9.1.2

4.2.10 Terminals for external conductors**4.2.10.1 Connections**

The smoke alarm or base, as appropriate, if intended to have external connections, shall provide for the connection of conductors by means of screws, nuts or equally effective devices. For mains-powered smoke alarms which utilize flexible lead connections, these connections shall be regarded as conductors. If terminals are provided, they shall allow the connection of conductors having nominal cross-sectional areas of between 0,4 mm² and 1,5 mm². Disconnection of the conductors, or access to the conductors for disconnection, shall not be possible without the use of a tool. Terminals shall be designed so that they clamp the conductor between metal surfaces without rotation of those surfaces but with sufficient contact pressure and without damage to the conductor.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.10.1.

4.2.10.2 Flexible lead connections

Flexible lead connections shall be held with sufficient force so as not to come detached by forces they may experience in the field.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.10.2.

4.2.11 Smoke alarm signals

In a smoke alarm which employs one or more non-fire alarm features the following operation shall be obtained:

- a. the smoke alarm fire alarm signal shall take precedence over any other signal even when such other signal is initiated first.
- b. distinctive signals shall be obtained between a smoke alarm's fire alarm and other non-fire alarm functions. Use of a common sounder is permitted if distinctive signals are obtained. If an audible fault signal is provided it shall be distinctive from all alarm signals but may be common to all functions employed.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.11.

4.2.12 Non-replaceable power sources

Upon installation of the smoke alarm the power source(s) (normal power source and the standby power source if applicable) shall be automatically activated.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.12.

4.2.13 Battery removal indication

The removal of any user-replaceable battery used to power, or provide back-up power, for the smoke detection circuit/sounder, from a battery or mains powered d.c. backed smoke alarm, shall result in a visual, mechanical or audible warning that the battery has been removed. The visual warning shall not depend upon a power source.

NOTE Conformity may be achieved by, but is not restricted to, one of the following examples:

- a) a warning flag that will be exposed with the battery removed and the cover closed;
- b) a hinged cover or battery compartment that cannot be closed when the battery is removed;
- c) a unit that cannot be replaced upon its mounting base/bracket with the battery removed.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.13.

4.2.14 Battery connections

4.2.14.1 Lead or terminal connections to batteries shall be identified with the proper polarity (plus or minus). The polarity may be indicated on the unit adjacent to the battery terminals or leads.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.14.1.

4.2.14.2 Any leads connecting the terminal connectors of batteries in smoke alarms to the smoke alarm circuit board shall be provided with strain relieving devices adjacent to both battery terminal connectors and the smoke alarm circuit board so that when the leads are subjected to normal handling they are not likely to become damaged or detached.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.14.2.

4.2.15 Battery capacity

The batteries supplied with or specified for use in smoke alarms shall be capable of supplying the quiescent load of the smoke alarm together with the additional load resulting from a routine weekly 10 s test for at least 1 year or duration specified by the manufacturer, if longer, before the battery fault warning is given. At the point when the battery fault warning commences, the batteries shall have sufficient capacity to give an alarm

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signal as specified in 5.2.19 for at least 4 min in the event of fire, or in the absence of fire, a battery fault warning for at least 30 days.

To verify battery capacity, data concerning the smoke alarm loads and the battery characteristics shall be used to indicate that the above requirements can be met at normal ambient conditions, assuming that the smoke alarm operates at ambient temperature during 50 weeks/year, at 0°C during 1 week/year and at 45°C during 1 week/year.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.15.

4.2.16 Battery fault warning

A smoke alarm shall give an audible fault warning before an increase in the internal resistance or decrease in the terminal voltage of the battery prevents correct operation.

Compliance is checked as per 5.2.16.

4.2.17 Battery reversal

The smoke alarm shall function properly after being misconnected with respect to polarity.

Compliance is checked as per 5.2.17.

4.2.18 Reduction of supply voltage to zero

A smoke alarm shall not give an alarm signal as the battery voltage decreases from the V_E to zero volts.

Compliance is tested as per 5.2.18.

4.2.19 Sound output

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The smoke alarm shall be capable of providing an adequate sound output.

Compliance is checked as per 5.2.19.

4.2.20 Sounder durability

The smoke alarm's sounder shall operate as intended after prolonged operation.

Compliance is checked as per 5.2.20.

4.2.21 Alarm silence facility (optional)

If means of temporarily disabling or desensitising a smoke alarm are provided the following shall apply.

- a. The initiation of the alarm silence period shall require the operation of a manual control on the smoke alarm.

NOTE 1 This control may be the same as a manual control provided for routine testing.

- b. Operation of the alarm silence control shall desensitise the smoke alarm for at least 5 min. The sensitivity of the smoke alarm shall be restored within 15 min of operation of the alarm silence control. If the alarm silence period is adjustable it shall not be possible to set it to less than 5 min or to more than 15 min.

- c. Continuous operation of the alarm silence control shall not lead to the smoke alarm being desensitised for more than 15 min without an audible warning being given.

NOTE 2 This requirement is intended to prevent the permanent loss of sensitivity due to accidental or deliberate jamming of the control.

Compliance is checked as per 5.2.21.

4.2.22 Protection against the ingress of foreign bodies

The smoke alarm shall be so designed that a sphere of diameter $(1,3 \pm 0,05)$ mm and a rectangular probe $1,0 \pm 0,05$ by $2,0 \pm 0,05$ mm, cannot pass into the sensor chamber(s).

NOTE This requirement is intended to restrict the access of insects into the sensitive parts of the smoke alarm. It is known that this requirement is not sufficient to prevent the access of all insects, however it is considered that extreme restrictions on the size of access holes may introduce the danger of clogging by dust etc. It may therefore be necessary to take other precautions against false alarms due to the entry of small insects.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.22.

4.2.23 Additional requirements for software controlled smoke alarms

4.2.23.1 General

For smoke alarms, which rely on software control in order to fulfil the requirements of this document, the requirements of 4.2.23.2, 4.2.23.3 and 4.2.23.4 shall be met.

4.2.23.2 Software documentation

4.2.23.2.1 The manufacturer shall submit documentation 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 document 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 smoke alarms;
 - 5) the way in which them 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.

4.2.23.2.2 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;

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- 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).

4.2.23.3 Software design

In order to ensure the reliability of the smoke alarm, 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 errors in the program operation;
- c. the software shall be designed to avoid the occurrence of deadlock of the program flow.

4.2.23.4 The storage of programs and data

The program necessary to comply with this document 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 a 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 power from the mains or any replaceable battery, unless provision is made for the automatic renewal of such data, following loss of power, within 1 h of power being restored.

Compliance with the requirements of 4.2.23 shall be checked as per 5.2.23.

4.2.24 Inter-connectable smoke alarms

If a means of connecting a number of smoke alarms to give a general alarm signal is provided the following shall apply (see 5.2.24).

- a. The audible alarm signal shall be emitted by all of the interconnecting smoke alarms when the smoke is detected by any one or more of them. If the smoke alarms are provided with an alarm silence facility, initiation of the alarm silence period of one of the smoke alarms shall not prevent the audible alarm signal being emitted by that smoke alarm when the smoke is detected by any of the other alarms.
- b. The interconnection of the maximum number of smoke alarms allowed by the manufacturer shall not have a significant effect on the sensitivity of the smoke alarms nor their ability to meet the battery capacity or sound output requirements (see 4.2.15 and 5.2.19).

- c. For battery-operated smoke alarms, open or short-circuits of the interconnecting leads either shall not prevent the smoke alarms from functioning individually or shall result in an alarm condition or fault warning.

NOTE This requirement does not apply to mains, or mains/battery supplied smoke alarms, for which the supply and interconnect wiring should be installed in accordance with the appropriate national regulations.

To confirm this, the smoke alarm shall be tested in accordance with 5.2.24.

4.2.25 Marking and data

4.2.25.1 Smoke alarm marking

Each alarm shall be indelibly marked with the following:

- a. the number and date of this document, i.e. EN 14604:20XX;
- b. the name or trade mark and address of the manufacturer or supplier;
- c. the model designation (type or number);
- d. functional principle (e.g. optical, ionisation, type A, or type B);
- e. the trefoil symbol for type B alarms.
- f. the date of manufacture, or the batch number;
- g. the manufacturer's recommended date for replacement, subject to normal, regular maintenance;
- h. smoke alarms incorporating user replaceable batteries: the type or numbers of batteries recommended by the manufacturer and an instruction to the user "Test the alarm for correct operation using the test facility, whenever the battery is replaced"; which shall be visible during the operation of changing the batteries;
- i. smoke alarms incorporating non-replaceable batteries: the warning "WARNING — Battery not replaceable — See instruction manual. .

Conformity shall be check as per 5.2.25.1.

4.2.25.2 Packaging marking

The point-of-sale carton, in which a smoke alarm employing a radionuclide is packaged, shall be permanently marked on the exterior with the trefoil symbol, name of radionuclide, and activity.

Conformity shall be checked as per 5.2.25.2.

4.2.25.3 Data

Information supplied on or with smoke alarms shall include instructions on siting, installation and maintenance.

The information provided with smoke alarms incorporating user-replaceable batteries shall include specific guidance on changing the batteries. This guidance shall include any advice which is necessary to ensure that the battery is properly connected. It shall also include a recommendation that the operation of the alarm is tested with the test facility whenever the batteries are replaced.