SLOVENSKI STANDARD

SIST EN 14604:2005

01-december-2005

Javljalniki dima

Smoke alarm devices

Rauchwarnmelder

Dispositifs d'alarme de fumée

Ta slovenski standard je istoveten z: EN 14604:2005

ICS:

13.220.20

13.320

SIST EN 14604:2005 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14604

July 2005

ICS 13.220.20; 13.320

English Version

Smoke alarm devices

Dispositif d'alarme de fumée

Rauchwarnmelder

This European Standard was approved by CEN on 21 March 2005.

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.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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

Ref. No. EN 14604:2005: E

Contents

Page

Foreword

This document (EN 14604:2005) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarms 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of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.

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.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies requirements, test methods, performance criteria, and manufacturer's instructions for smoke alarms that operate using scattered light, transmitted light or ionization, intended for household or similar residential application.

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. Smoke alarms with special features, such as radio interlinking 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 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.

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 54-3, *Fire detection and fire alarm systems — Part 3: Fire alarm devices — Sounders*

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

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

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

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

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

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 60950-1:2001, *Information technology equipment — Safety — Part 1: General requirements (IEC 60950-1:2001, 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)*

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

3.4
fault warning
signal intended to indicate an actual or incipient fault that might prevent the emitting of a fire alarm signal

3.5
inter-connectable smoke alarm
smoke alarm which may be interconnected with other smoke alarms to provide a common alarm

3.6
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

3.7
normal power source
primary source of power intended to supply the smoke alarm

3.8
response threshold
smoke concentration at which the smoke alarm changes to its alarm condition

3.9
smoke alarm
device containing within one housing all the components, except possibly the energy source, necessary for detecting smoke and for giving an audible alarm

3.10
standby power source
source of power intended to supply the smoke alarm in the event of a failure of the normal power source

4 General requirements

4.1 Compliance

In order to comply with this document the smoke alarm shall meet the requirements of this clause, 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. For smoke alarms which a manufacturer claims are suitable for leisure accommodation vehicles, the tests in Annex L shall be applied.

4.2 Individual alarm indicator (optional)

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

4.3 Mains-on indicator

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.

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.

4.4 Connection of external ancillary devices

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

4.5 Means of calibration

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

4.6 User replaceable components

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

4.7 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 for at least one year's life, including routine testing (see 4.15).

A distinctive audible fault signal shall be given before the battery is incapable of operating for alarm purposes (see 5.16).

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 4.15).

The internal power source shall be replaceable by the user unless its operating life (see 4.15) in the smoke alarm is 10 years or greater.

4.8 Standby power source

4.8.1 General

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 4.15;

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 5.17 for at least 4 min in the event of fire, or in the absence of a fire, a fault warning for at least 24 h.

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.

4.8.2 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 (see 5.23).

4.9 Electrical safety requirements

The apparatus shall be designed and constructed so as to present no danger, either in normal use or under fault conditions, as determined by the tests and requirements in 5.24.

4.10 Routine test facility

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.

4.11 Terminals for external conductors

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 a "flying lead"–type connector, this connector shall be regarded as a conductor. If terminals are provided, they shall allow the connection of conductors having nominal cross-sectional areas of between 0,4 mm^2 and 1,5 mm^2. 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.

Flying lead type connectors shall be subjected to a pull test, such that when the connector is subjected to a pull of 20 N without jerks for 1 min in any direction allowed by the design, the connector does not become detached.

4.12 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.

4.13 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.

4.14 Battery connections

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.

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 a pull of 20 N without jerks for 1 min in any direction allowed by the design, the pull is not transmitted to the joints between the leads and the battery terminal connectors or between the leads and the smoke alarm circuit board.

4.15 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 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 signal as specified in 5.17 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.

In the absence of suitable test procedures to verify battery capacity, data concerning the smoke alarm loads and the battery characteristics shall be used to indicate that the above requirement can be met.

4.16 Protection against the ingress of foreign bodies

The smoke alarm shall be so designed that a sphere of diameter (1,3 ± 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.

4.17 Additional requirements for software controlled smoke alarms

4.17.1 General

For smoke alarms, which rely on software control in order to fulfil the requirements of this document, the requirements of 4.17.2, 4.17.3 and 4.17.4 shall be met.

4.17.2 Software documentation

4.17.2.1 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 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.

4.17.2.2 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;

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).

4.17.3 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.

4.17.4 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.

4.18 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 5.19).

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 4.15 and 5.17).

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.

4.19 Marking and data

4.19.1 Smoke alarm marking

Each alarm shall be indelibly marked with the following:

a) the number and date of this document, i.e. EN 14604:2005;

b) the name or trade mark and address of the manufacturer or supplier;

c) the date of manufacture, or the batch number;

d) the manufacturer's recommended date for replacement, subject to normal, regular maintenance;

e) 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;

f) smoke alarms incorporating non-replaceable batteries: the warning "WARNING — Battery not replaceable — See instruction manual" which shall be visible during normal use.

Conformity shall be checked by visual inspection. The indelibility of the marking shall be checked by establishing that it cannot be removed when rubbed lightly with a piece of cloth soaked with petroleum spirit and then water.

4.19.2 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.

4.19.3 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.

NOTE It is recommended that the guidance should also state that if the alarm fails to operate correctly, the advice of the manufacturer should be sought.

For smoke alarms incorporating non-replaceable batteries, information shall be given on the action to be taken if a battery fault warning is emitted.

Information for inter-connectable smoke alarms shall state the maximum number that may be interconnected. Details of suitable cables shall also be given.

Information for smoke alarms intended for connection to mains supplies shall include a warning that draws attention to the hazards associated with mains voltages and recommends that the smoke alarm, together with any associated supply and interconnect wiring, be installed in accordance with appropriate national electrical installation regulations.

If it is claimed that the smoke alarm is also suitable for use in leisure accommodation vehicles (LAVs) this shall be clearly stated in the information supplied on or with the smoke alarm.

5 Tests

5.1 General

5.1.1 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 60068-1:1994 as follows:

a) temperature 15 °C to 35 °C;

b) relative humidity 25 % to 75 %;

c) air pressure 86 kPa 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.

5.1.2 Operating conditions for tests

If a test method requires a specimen to be operational, then the specimen shall be connected to, or provided with, a suitable power source with characteristics as required by the manufacturer's data. Unless otherwise specified in the test method, the power source 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.

5.1.3 Mounting arrangements

The specimen shall be mounted by its normal means of attachment in accordance with the manufacturer's instructions. If these instructions describe more than one method of mounting then the method considered to be most unfavourable shall be chosen for each test.

5.1.4 Tolerances

If a specific tolerance or limit is not specified in a requirement or test procedure, a tolerance of ± 5 % shall be applied.

5.1.5 Measurement of response threshold value

The specimen, for which the response threshold value is to be measured, shall be installed in the smoke tunnel, described in Annex A, in its normal operating position, by its normal means of attachment. The orientation of the specimen, relative to the direction of airflow, shall be the least sensitive orientation, as determined in the directional dependence test, unless otherwise specified in the test procedure.

Before commencing each measurement, the smoke tunnel shall be purged with clean air to ensure that the tunnel and the specimen are free from the test aerosol.

The air velocity in the proximity of the specimen shall be (0,2 ± 0,04) ms^{-1} during the measurement, unless otherwise specified in the test procedure.

Unless otherwise specified in the test procedure, the air temperature in the tunnel shall be (23 ± 5) °C and shall not vary by more than 5 °C for all the measurements on a particular smoke alarm type.

The specimen shall be connected to its power source as described in 5.1.2, and shall be allowed to stabilize for at least 15 min, unless otherwise specified by the manufacturer.

The test aerosol, as described in Annex B, shall be introduced into the tunnel such that the rate of increase of aerosol density is as follows:

$$0{,}015 \le \frac{\Delta m}{\Delta t} \le 0{,}1 \text{ dB m}^{-1}\text{min}^{-1}$$ for smoke alarms using scattered or transmitted light;

$$0{,}05 \le \frac{\Delta y}{\Delta t} \le 0{,}3 \text{ min}^{-1}$$ for smoke alarms using ionization.