BRITISH STANDARD

BS EN 14604:2005

Incorporating corrigendum October 2008

Smoke alarm devices

ICS 13.220.20; 13.320

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 14604:2005, incorporating corrigendum October 2008. It supersedes BS 5446-1:2000 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Commitee FSH/12, Fire detection and alarm systems, to Subcommittee FSH/12/2, Fire detectors.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2005

ISBN 978 0 580 65089 5

Amendments/corrigenda issued since publication

Date	Comments
30 April 2009	Implementation of CEN corrigendum October 2008. Second sentence modified in third paragraph of Scope

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14604

July 2005

ICS 13.220.20; 13.320

Incorporating corrigendum October 2008

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.

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Ref. No. EN 14604:2005: E

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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of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.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. ⟨AC1⟩ Special features of smoke alarms, such as radio interlinking or special characteristics and developed for specific risks, are not covered by this document. ⟨AC1⟩

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:

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

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

NOTE These ranges are intended to allow the selection of a convenient rate, depending upon the smoke alarm's sensitivity, to obtain a response in a reasonable time.

The initially selected rate of increase in aerosol density shall be similar for all measurements on a particular smoke alarm type.

All aerosol density measurements shall be made in the proximity of the specimen.

The response threshold value is the aerosol density (m or y) at the moment that the specimen gives an alarm signal. This shall be recorded as m (dB m^{-1}) for smoke alarms using scattered or transmitted light, or as *y* for smoke alarms using ionization (see Annex C).

5.1.6 Provision for tests

The following shall be provided for testing compliance:

a) 20 specimens;

b) data required in 4.19.

The specimens submitted shall be deemed representative of the manufacturer's normal production with regard to their construction and calibration.

This implies that the mean response threshold value of the 20 specimens, found in the initial sensitivity test, shall also represent the production mean, and that the limits specified in the initial sensitivity test shall also be applicable to the manufacturer's production.

5.1.7 Test schedule

The smoke alarms shall be numbered as specified in 5.4.2. The tests on each smoke alarm indicated in Table 1 shall be carried out in the order in which they are listed.

Table 1 — Test schedule

Test	Clause	Specimen number(s)
Repeatability	5.2	One chosen arbitrarily
Directional dependence	5.3	One chosen arbitrarily
Initial sensitivity	5.4	All specimens
Air movement	5.5	10
Dazzling	5.6	2
Dry heat	5.7	3
Cold (operational)	5.8	4
Damp heat (operational)	5.9	5
Sulphur dioxide (SO_2) corrosion	5.10	6, 7
Impact	5.11	8
Vibration (operational)	5.12	9
Vibration (endurance)	5.13	9
Mains supply voltage dips and short interruptions	5.14	2
Electrostatic discharge	5.14	10
Radiated electromagnetic fields	5.14	11
Conducted disturbances induced by electromagnetic field	5.14	2
Fast transient bursts	5.14	12
Slow high energy transients	5.14	13
Fire sensitivity	5.15	17, 18, 19, 20
Battery fault warning	5.16	1,15
Sound output	5.17	1,15
Sounder durability	5.18	15
Inter-connectable smoke alarms	5.19	14
Alarm silence facility	5.20	16
Variation in supply voltage	5.21	2
Polarity reversal	5.22	16
Back-up power source	5.23	Additional specimens (as required)
Electrical safety	5.24	Additional specimens (as required)
Alarms for leisure accommodation vehicles	Annex L	9

NOTE The test specified in 5.6 is only applied to detectors using scattered light or transmitted light, as detectors using ionization are considered unlikely to be influenced.

5.2 Repeatability

5.2.1 Object

To show that the smoke alarm has stable behaviour with respect to its sensitivity even after a number of alarm conditions.

5.2.2 Test procedure

The response threshold value of the specimen to be tested shall be measured as described in 5.1.5 six times.

The specimen's orientation relative to the direction of air flow is arbitrary, but it shall be the same for all six measurements.

The maximum response threshold value shall be designated y_{max} or m_{max}, the minimum value shall be designated y_{min} or m_{min}.

5.2.3 Requirements

The ratio of the response threshold values y_{max}:y_{min} *or* m_{max}:m_{min} shall be not greater than 1,6.

The lower response threshold value y_{min} shall be not less than 0,2 or m_{min} shall be not less than 0,05 dB m^{-1}.

5.3 Directional dependence

5.3.1 Object

To show that the sensitivity of the smoke alarm is not unduly dependent on the direction of airflow around the smoke alarm.

5.3.2 Test procedure

The response threshold value of the specimen to be tested shall be measured eight times as described in 5.1.5 with the specimen being rotated 45° about its vertical axis between each measurement, so that the measurements are taken for eight different orientations relative to the direction of air flow.

The maximum response threshold value shall be designated y_{max} or m_{max}, the minimum value shall be designated y_{min} or m_{min}.

The orientations, for which the maximum and minimum response threshold values were measured, shall be noted.

In the following tests the orientation, for which the maximum response threshold was measured, is referred to as the least sensitive orientation and the orientation, for which the minimum response threshold was measured, is referred to as the most sensitive orientation.

5.3.3 Requirements

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

The lower response threshold value y_{min} shall not be less than 0,2 or m_{min} shall not be less than 0,05 dB m^{-1}.

5.4 Initial sensitivity

5.4.1 Object

To establish the sensitivity of each smoke alarm prior to testing. This will be used as a baseline for the following tests.

5.4.2 Test procedure

Measure the response threshold value of the specimens as described in 5.1.5. Number the smoke alarms in order of sensitivity, number 1 having the lowest response threshold and number 20 the highest response threshold.

The maximum response threshold value shall be designated y_{max} or m_{max} and the minimum value shall be designated y_{min} or m_{min}. The mean of these response threshold values shall be calculated and shall be designated as $\overline{y}$ or $\overline{m}$.

5.4.3 Requirement

The following relationships shall hold y_{max}: $\overline{y}$ or m_{max}: $\overline{m}$ ≤ 1,33 and $\overline{y}$:y_{min} or $\overline{m}$:m_{min} ≤ 1,5.

5.5 Air movement

5.5.1 Object

To show that the sensitivity of the smoke alarm is not unduly affected by the rate of the air flow, and that it is not unduly prone to false alarms in draughts or in short gusts.

5.5.2 Test procedure

The response threshold value of the specimen to be tested is measured as described in 5.1.5 in the most and least sensitive orientations, and shall be appropriately designated $y_{(0,2)max}$ and $y_{(0,2)min}$ or $m_{(0,2)max}$ and $m_{(0,2)min}$.

These measurements shall then be repeated but with an air velocity in the proximity of the smoke alarm of (1 ± 0,2) ms^{-1}. The response threshold values in these tests shall be designated $y_{(1,0)max}$ and $y_{(1,0)min}$ or $m_{(1,0)max}$ and $m_{(1,0)min}$.

For ionization chamber alarms only, the specimen to be tested shall then be subjected, in its most sensitive orientation, to an aerosol-free air flow at a velocity of (5 ± 0,5) ms^{-1} for a period of 5 min.

5.5.3 Requirements

One of the following relationships shall hold:

a) $$0{,}625 \leqslant \frac{y_{(0,2)\,max.} + y_{(0,2)\,min.}}{y_{(1,0)\,max.} + y_{(1,0)\,min.}} \leqslant 1{,}6$$; or

b) $$0{,}625 \leqslant \frac{m_{(0,2)\,max.} + m_{(0,2)\,min.}}{m_{(1,0)\,max.} + m_{(1,0)\,min.}} \leqslant 1{,}6$$

and the alarm shall emit neither a fault signal nor an alarm signal during the test with aerosol free air.

5.6 Dazzling

5.6.1 Object

To show that the sensitivity of the smoke alarm is not unduly influenced by the close proximity of artificial light sources. This test is only applied to smoke alarms using scattered light or transmitted light as ionization chamber smoke alarms are considered unlikely to be influenced.

5.6.2 Test procedure

The dazzling apparatus, described in Annex D, is installed in the smoke tunnel described in Annex A. The specimen is installed in the dazzling apparatus in the least sensitive orientation and connected to its power source as described in 5.1.2. The following test procedure is then applied.

The response threshold value is measured as described in 5.1.5.

The four lamps are switched simultaneously ON for 10 s and then OFF for 10 s, ten times.

The four lamps are then switched ON again and after at least 1 min the response threshold value is measured as described in 5.1.5, with the lamps ON.

The four lamps are then switched OFF.

The above procedure is then repeated, but with the smoke alarm rotated 90° in one direction (either direction may be chosen), from the least sensitive orientation.

For each orientation, the maximum response threshold value shall be designated m_{max} and the minimum response threshold value shall be designated m_{min}.

5.6.3 Requirements

During the periods when the switching sequences are being conducted and when the lamps are all on for at least 1 min, the specimen shall emit neither an alarm nor fault signal.

For each orientation, the ratio of the response threshold m_{max}:m_{min} shall not be greater than 1,6.

5.7 Dry heat

5.7.1 Object

To demonstrate the ability of the smoke alarm to function correctly at high ambient temperatures, which may occur for short periods in the service environment.

5.7.2 Test procedure

The specimen to be tested shall be installed in the smoke tunnel described in Annex A, in its least sensitive orientation, with an initial air temperature of (23 ± 5) °C, and shall be connected to its power source as described in 5.1.2.

The air temperature in the tunnel shall then be increased to (55 ± 2) °C, at a rate not exceeding 1 °C min^{-1}, and maintained at this temperature for 2 h.

The response threshold value shall then be measured as described in 5.1.5 but with the temperature at (55 ± 2) °C.

Of the two response threshold values measured for the specimen in this test and the initial sensitivity test, the greater shall be designated y_{max} or m_{max} and the lesser y_{min} or m_{min}.

5.7.3 Requirements

No alarm of fault signals shall be given during the conditioning. The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.8 Cold (operational)

5.8.1 Object

To demonstrate the ability of the smoke alarm to function correctly at low ambient temperatures, which may occur for short periods in the service environment.

5.8.2 Test procedure

The specimen to be tested shall be installed in the smoke tunnel described in Annex A, in its least sensitive orientation, with an initial air temperature of (23 ± 5) °C, and shall be connected to its power source as described in 5.1.2.

The air temperature in the tunnel shall then be decreased to (0 ± 2) °C, at a rate not exceeding 1 °Cmin^{-1}, and maintained at this temperature for 2 h.

The response threshold value shall then be measured as described in 5.1.5 but with the temperature at (0 ± 2) °C.

Of the two response threshold values measured for the specimen in this test and the initial sensitivity test, the greater shall be designated y_{max} or m_{max} and the lesser y_{min} or m_{min}.

5.8.3 Requirement

No alarm or fault signals shall be given during the conditioning.

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.9 Damp heat (operational)

5.9.1 Object

To demonstrate the ability of the smoke alarm to function correctly after exposure to high relative humidity (without condensation) and temperature, which may occur for short periods in the service environment.

5.9.2 Test procedure

The specimen to be tested shall be exposed to an initial air temperature of (40 ± 2) °C, and a relative humidity of less than 45 %.

After 2 h, the relative humidity is to be increased to (93 ± 3) % over a period of 1 h. This temperature and humidity shall be maintained for a period of 4 days.

The specimen shall have a recovery period of 1 h to 2 h at the standard laboratory conditions.

The response threshold value shall then be measured as described in 5.1.5.

Of the two response threshold values measured for the specimen in this test and the initial sensitivity test, the greater shall be designated y_{max} or m_{max} and the lesser y_{min} or m_{min}.

5.9.3 Requirements

No alarm or fault signals shall be given during the conditioning.

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.10 Sulphur dioxide (SO_2) corrosion

5.10.1 Object

To demonstrate the ability of the smoke alarm to withstand the corrosive effects of sulphur dioxide as an atmospheric pollutant.

5.10.2 Test procedure

5.10.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-42:2003, except that the conditioning shall be as described below.

5.10.2.2 State of the specimen during conditioning

The specimen shall be mounted as described in 5.1.3. It shall not be supplied with power during the conditioning, but it shall have untinned copper wires, of the appropriate diameter, connected to sufficient terminals to allow the final measurement to be made, without making further connections to the specimen.

5.10.2.3 Conditioning

The following conditioning shall be applied:

Temperature	(25 ± 2) °C;
Relative humidity	(93 ± 3) %;
SO_2 concentration	(25 ± 5) ppm (by volume) i.e. (25 ± 5) x 10^{-6};
Duration	4 days.

5.10.2.4 Final measurements

Immediately after the conditioning, the specimen shall be subjected to a drying period of 16 h at 40 °C, ≤ 50 % RH, followed by a recovery period of 1 h to 2 h at the standard laboratory conditions. After this recovery period, the response threshold value shall be measured as described in 5.1.5.

The greater of the response threshold value measured in this test and that measured for the same specimen in the initial sensitivity test shall be designated y_{max} or m_{max}, and the lesser shall be designated y_{min} or m_{min}.

5.10.3 Requirements

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.11 Impact

5.11.1 Object

To demonstrate the immunity of the smoke alarm to mechanical impacts upon its surface, which it may sustain in the normal shipping, installation and service environment, and which it can reasonably be expected to withstand.

5.11.2 Test procedure

5.11.2.1 Apparatus

The test apparatus shall consist of a swinging hammer incorporating a rectangular-section aluminium alloy head (aluminium alloy AlCu4SiMg complying with EN 573-4, solution treated and precipitation treated condition) with the plane impact face chamfered to an angle of 60° to the horizontal, when in the striking position (i.e. when the hammer shaft is vertical). The hammer head shall be (50 ± 2,5) mm high, (76 ± 3,8) mm wide and (80 ± 4) mm long at mid height as shown in Figure E.1. A suitable apparatus is described in Annex E.

5.11.2.2 State of the specimen during conditioning

The specimen shall be rigidly mounted to the apparatus by its normal mounting means and shall be positioned so that it is struck by the upper half of the impact face when the hammer is in the vertical position (i.e. when the hammer head is moving horizontally). The azimuthal direction and position of impact, relative to the specimen, shall be chosen as that most likely to impair the normal functioning of the specimen.

The specimen shall be connected to its power source as described in 5.1.2.

5.11.2.3 Conditioning

The following conditioning shall be applied:

Impact energy	(1,9 ± 0,1) J;
Hammer velocity	(1,5 ± 0,13) ms^{-1};
Number of impacts	1.

5.11.2.4 Measurements during conditioning

The specimen shall be monitored during the conditioning and for a further 2 min after the impact to detect any alarm or fault signals.

5.11.2.5 Final measurements

After the conditioning the response threshold value shall be measured as described in 5.1.5.

The greater of the response threshold value measured in this test and that measured for the same specimen in the initial sensitivity test shall be designated y_{max} or m_{max}, and the lesser shall be designated y_{min} or m_{min}.

5.11.3 Requirements

No alarm or fault signals shall be given during the conditioning or the additional 2 min.

The impact shall not detach the alarm from its base, or the base from the mounting. The cover of the smoke alarm shall not unscrew or open.

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.12 Vibration (operational)

5.12.1 Object

To demonstrate the immunity of the smoke alarm to vibration at levels considered appropriate to the normal service environment.

5.12.2 Test procedure

5.12.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-6:1995 and as described below.

5.12.2.2 State of the specimen during conditioning

The specimen shall be mounted on a rigid fixture as described in 5.1.3 and shall be connected to its power source as described in 5.1.2.

The vibration shall be applied in each of three mutually perpendicular axes, in turn. The specimen shall be mounted so that one of the three axes is perpendicular to its normal mounting plane.

5.12.2.3 Conditioning

The following conditioning shall be applied:

Frequency range	(10 to 150) Hz;
Acceleration amplitude	5 m s^{-2} (≈ 0,5 g_n);
Number of axes	3;
Sweep rate	1 octave min^{-1};
Number of sweep cycles	1 per axis.

NOTE The vibration operational and endurance tests may be combined such that the specimen is subjected to the operational test conditioning followed by the endurance test conditioning in one axis before changing to the next axis. Only one final measurement need then be made.

5.12.2.4 Measurements during conditioning

The specimen shall be monitored during the conditioning period to detect any alarm or fault signals.

5.12.2.5 Final measurements

After the conditioning the specimen is to be inspected visually for mechanical damage both internally and externally. The response threshold value shall be measured as described in 5.1.5.

The greater of the response threshold value measured in this test and that measured for the same specimen in the initial sensitivity test shall be designated y_{max} or m_{max}, and the lesser shall be designated y_{min} or m_{min}.

5.12.3 Requirements

No alarm or fault signals shall be given during the conditioning. No mechanical damage, either internally or externally, shall result. The lid of the smoke alarm shall not unscrew or open.

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.13 Vibration (endurance)

5.13.1 Object

To demonstrate the ability of the smoke alarm to withstand the long term effects of vibration at levels appropriate to the shipping, installation and service environment.

5.13.2 Reference

The test apparatus and procedure shall be as described in EN 60068-2-6:1995 and as described below.

5.13.2.1 State of the specimen during conditioning

The specimen shall be mounted on a rigid fixture as described in 5.1.3, but shall not be supplied with power during conditioning.

The vibration shall be applied in each of three mutually perpendicular axes, in turn. The specimen shall be mounted so that one of the three axes is perpendicular to its normal mounting axis.

5.13.2.2 Conditioning

The following conditioning shall be applied:

Frequency range	(10 to 150) Hz;
Acceleration amplitude	10 m s^{-2} (1,0 g_n);
Number of axes	3;
Sweep rate	1 octave min^{-1};
Number of sweep cycles	20 per axis.

NOTE The vibration operational and endurance tests may be combined such that the specimen is subjected to the operational test conditioning followed by the endurance test conditioning in one axis before changing to the next axis. Only one final measurement need then be made.

5.13.2.3 Final measurements

After the conditioning the response threshold value shall be measured as described in 5.1.5.

The greater of the response threshold value measured in this test and that measured for the same specimen in the initial sensitivity test shall be designated y_{max} or m_{max}, and the lesser shall be designated y_{min} or m_{min}.

5.13.3 Requirements

The ratio of the response threshold values y_{max}:y_{min} or m_{max}:m_{min} shall not be greater than 1,6.

5.14 Electromagnetic Compatibility (EMC), immunity tests (operational)

The following EMC immunity tests shall be carried out, as described in EN 50130-4:1995:

a) mains supply voltage dips and short interruptions;

b) electrostatic discharge;

c) radiated electromagnetic fields;

d) conducted disturbances induced by electromagnetic fields;

e) fast transient bursts;

f) slow high-energy voltage surges.

The required operating condition shall be as described in 5.1.2.

For these tests the criteria for compliance specified in EN 50130-4:1995 and the following shall apply.

1) The functional test, called for in the initial and final measurements, shall be as follows:

   — the response threshold value shall be measured as described in 5.1.5.

   — the greater of the response threshold value measured in this test and that measured for the same specimen in the initial sensitivity test shall be designated y_{max} or m_{max}, and the lesser shall be designated y_{min} or m_{min}.

2) The acceptance criteria for the functional test after the conditioning shall be as follows:

   — the ratio of the response threshold values y_{max} : y_{min} or m_{max} : m_{min} shall not be greater than 1,6.

5.15 Fire sensitivity

5.15.1 Object

To demonstrate the ability of the smoke alarm to respond to a broad spectrum of smoke types as required for general application in fire detection systems for residences.

5.15.2 Test procedure

5.15.2.1 General

The fire sensitivity tests shall be conducted in a room as shown in Annex F.

The specimens shall be subjected to the four test fires TF2 to TF5. The type, quantity and arrangement of the fuel and the method of combustion are described in Annexes G to J, for each test fire, along with the end of test condition and the required profile curve limits.

In order to be a valid test fire, the development of the fire shall be such that the profile curves of m against y, and m against time, fall within the specified limits, up to the time when all of the specimens have generated an alarm signal, or the end of test condition is reached, whichever is the earlier. If

these conditions are not met then the test is invalid and shall be repeated. It is permissible, and may be necessary, to adjust the quantity and arrangement of the fuel to obtain valid test fires.

5.15.2.2 Mounting of the specimens

The specimens shall be mounted in accordance with the manufacturer's instructions, such that they are in the least sensitive orientation, relative to an assumed air flow from the centre of the room to the specimen.

For smoke alarms intended for wall mounting only, the four specimens shall be mounted within 0,5 m of the middle of the long walls as shown in Annex F with specimens 18 and 19 at the least distance below the ceiling, and specimens 17 and 20 at the greatest distance below the ceiling, consistent with the manufacturer's instructions.

For smoke alarms intended for either ceiling or wall mounting, specimens 17 and 18 shall be mounted on the ceiling within the designated area and specimens 19 and 20 shall be mounted on the walls as described above.

Each specimen shall be connected to its power source as described in 5.1.2, and shall be allowed to stabilize in its quiescent condition before the start of each test fire.

5.15.2.3 Initial conditions

Before each test fire the room shall be ventilated with clean air until it is free from smoke, and so that the conditions listed below can be obtained.

The ventilation system shall then be switched off and all doors, windows and other openings shall be closed. The air in the room shall then be allowed to stabilize, and the following conditions shall be obtained before the test is started:

Temperature $T = (23 \pm 5)$ °C[1)] ;

Air movement: negligible

$y = 0{,}05$;

$m = 0{,}02$ dB m^{-1}.

5.15.2.4 Recording of the fire parameters and response values

During each test fire the fire parameters shown in Table 2 shall be recorded against the time from the start of the test. Each parameter shall be recorded continuously or at least once per second.

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1) The stability of the air and temperature affects the smoke flow within the room. This is particularly important for the test fires, which produce low thermal lift for the smoke (e.g. TF2 and TF3). It is therefore recommended that the difference between the temperature near the floor and the ceiling is < 2°C, and that local heat sources that can cause convection currents (e.g. lights and heaters) should be avoided. If it is necessary for people to be in the room at the beginning of a test fire, they should leave as soon as possible, taking care to produce the minimum disturbance to the air.

Table 2 — Fire parameters and response values

Parameter	Symbol	Units
Temperature change	ΔT	°C
Smoke density (ionization)	y	dimensionless
Smoke density (optical)	m	dB m^{-1}

The alarm signal given by the specimen shall be taken as the indication that an alarm has responded to the test fire.

The time of response of each specimen shall be recorded along with the fire parameters ΔT_a, y_a, and m_a, at the moment of response. The response of the smoke alarm after the end of test condition has been reached shall be ignored.

5.15.3 Requirements

All four specimens shall generate an alarm signal, in each test fire, before the specified end of test condition is reached.

5.16 Battery fault warning

5.16.1 Object

To demonstrate that a smoke alarm will give an audible fault warning before an increase in the internal resistance or decrease in the terminal voltage of the battery prevents correct operation.

5.16.2 Test procedure

5.16.2.1 Connect the alarm as shown in Figure 1 and apply the tests described in 5.16.2.2 to 5.16.2.5.

5.16.2.2 With the series resistor R set to zero and the supply voltage V set to the rated battery voltage V_R, measure the response threshold of the alarm in accordance with 5.1.5.

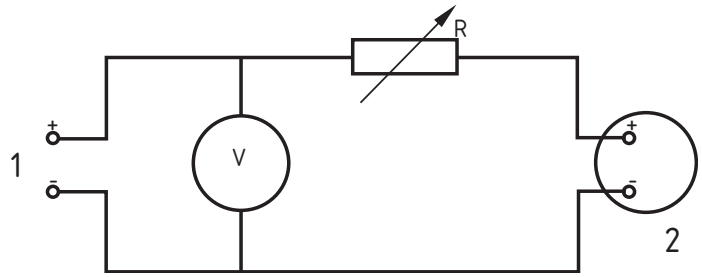
5.16.2.3 With the series resistor R set to zero, decrease the supply voltage V in stages of 0,1 volts at intervals of at least 1 min, until the fault warning is given. Record the supply voltage at which the fault warning is given as V_E and measure the response threshold of the alarm in accordance with 5.1.5.

5.16.2.4 With the supply voltage V set at V_R, increase the resistance of the series resistor R from zero in increments of 1 Ω at intervals of at least 1 min until the fault warning is given. Record the resistance of the series resistor at which the fault warning is given as R_A and measure the response threshold of the alarm in accordance with 5.1.5.

5.16.2.5 Repeat the procedure described in 5.16.2.4 with the supply voltage V set at 0,75 ($V_R - V_E$) + V_E, 0,5 ($V_R - V_E$) + V_E, and 0,25 ($V_R - V_E$) + V_E in turn, and record the resistances of the series resistor at which the fault warning is given as R_B, R_c and R_D, respectively.

5.16.3 Requirements

The ratio of the response thresholds measured in 5.16.2.3, 5.16.2.4 or 5.16.2.5 to the response threshold measured in 5.16.2.2 shall be not less than 0,625 and not greater than 1,6.



Key
1 Regulated dc power supply
2 Self contained smoke alarm with battery removed

Figure 1 — Battery fault warning test circuit

5.17 Sound output

5.17.1 Object

To demonstrate that the smoke alarm is capable of providing an adequate sound output.

5.17.2 Method of test

At least two samples shall be tested. Units intended additionally for multiple-station interconnection shall be tested in that configuration with the maximum line resistance and maximum number of networked alarms, and the sound output measured on the smoke alarm subject to an abnormal smoke condition. Mains powered smoke alarms shall be tested when connected to a source of rated voltage and frequency. Battery powered (or equivalent) smoke alarms shall be tested with the battery depleted to a point just above or at the battery fault warning level. Mains powered smoke alarms incorporating a stand-by power source shall be tested both as mains and battery powered as described above.

NOTE 1 If more than five smoke alarms can be interconnected it is permissible to interconnect a minimum of five alarms and simulate the remainder by an equivalent electrical load.

The smoke alarm shall be mounted on a mounting board as described in EN 54-3. The sound level shall be measured 3 m from the smoke alarm either directly in front of the smoke alarm or at an angle specified by the manufacturer within 45° of this.

A sound level meter conforming to EN 61672-1:2003, class 2 or better shall be used.

The A-weighted sound level shall be measured and recorded in dB using the F (Fast) detector indicator characteristic. In the case of fluctuating sound, the maximum value indicated during at least a complete cycle of the sound pattern shall be taken.

The measurement shall be made in a free field condition to minimize the effects of reflected sound energy. The ambient noise level shall be at least 10 dB (A) below the measured level produced by the alarm.

NOTE 2 Free field conditions may be simulated by mounting the unit on a wooden board with the centre of the alarm under test at least 1,2 m above the ground (see EN 54-3) and with the microphone located 3 m from the unit and directly in front and conducting the test outdoors on a clear day with a wind velocity of not more than 8 km h^{-1} and an ambient temperature of 15 °C to 25 °C.

NOTE 3 Alternatively an anechoic chamber of not less than 28 m^3, with no dimension less than 2 m and with an absorption factor of 0,99 or greater from 100 Hz to 10 kHz for all surfaces, may be used for this measurement.

5.17.3 Requirements

For battery operated alarms, the sound output shall be at least 85 dB(A) at 3 m after 1 min of alarm operation and at least 82 dB(A) after 4 min of alarm operation.

For mains powered alarms, the sound output shall be at least 85 dB(A) at 3 m after 4 min of alarm operation.

For both battery operated and main powered alarms, the maximum sound output shall be 110 dB(A) at 3 m after 1 min of alarm operation.

The maximum nominal frequency shall not exceed 3,5 kHz.

5.18 Sounder durability

5.18.1 Object

To demonstrate the ability of the smoke alarm's sounder to operate as intended after prolonged operation.

5.18.2 Test procedure

Connect the specimen to its power source as described in 5.1.2. Battery operated smoke alarms shall use a stabilized supply adjusted to the specified voltage.

Operate the specimen for 8 h of alternate 5-minute periods of energization and de-energization in the standby and alarm conditions.

After the conditioning, the sound output of the smoke alarm shall be measured as specified in 5.17.

5.18.3 Requirements

The specimen shall meet the sound output requirements as specified in 5.17.

5.19 Inter-connectable smoke alarms

5.19.1 Object

To demonstrate correct functioning of inter-connectable smoke alarms.

5.19.2 Test procedure

5.19.2.1 Connect the alarm under test with the maximum number of smoke alarms allowed in the manufacturer's instructions (see 4.19).

NOTE If more than five smoke alarms may be interconnected it is permissible to interconnect a minimum of five alarms and simulate the remainder by an equivalent electrical load.

Trigger one smoke alarm into the alarm condition and check all of the interconnected alarms for an audible alarm signal.

If the smoke alarms have an alarm silence facility, operate the alarm silence control on one smoke alarm and, during the alarm silence period, trigger another smoke alarm into the alarm condition. Check the interconnected smoke alarms for an audible alarm signal, including the smoke alarm in the alarm silence condition.

5.19.2.2 With the smoke alarms interconnected in accordance with 5.19.2.1, measure the response threshold of the alarm under test in accordance with 5.1.5.

5.19.2.3 For battery-operated smoke alarms repeat the test in 5.19.2.2 with the interconnecting leads short circuited.

5.19.2.4 With smoke alarms interconnected in accordance with 5.19.2.1, repeat the sound output test in 5.17 on one of the smoke alarms. During this test ensure that the other interconnected smoke alarms are sufficiently screened or distanced so that their audible alarm signals do not influence the measurement.

5.19.2.5 For battery-operated smoke alarms repeat the test in 5.19.2.4 with interconnecting leads short-circuited.

5.19.2.6 Reassess the battery capacity requirements taking into account the load introduced by interconnecting the maximum permitted number of smoke alarms.

5.19.3 Requirements

5.19.3.1 All the interconnected smoke alarms shall give an audible alarm signal within 1 min when tested in accordance with 5.19.2.1.

5.19.3.2 The ratio(s) of the response thresholds measured in accordance with 5.19.2.2 and, for battery operated smoke alarms the response thresholds measured in accordance with 5.19.2.3, to the response threshold measured for the same specimen in accordance with 5.4 shall be between 0,625 and 1,6.

5.19.3.3 The sound output shall be at least 85 dB(A) when measured in accordance with 5.19.2.4 and, for battery-operated smoke alarms, when measured in accordance with 5.19.2.5.

5.19.3.4 The assessment in 5.19.2.6 shall indicate that the battery capacity requirements specified in 4.15 can still be met.

5.20 Alarm silence facility (optional)

5.20.1 Object

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.

5.20.2 Test requirement

5.20.2.1 Generate smoke in accordance with 5.1.5, in the smoke tunnel specified in Annex A, with an air velocity of (0,2 ± 0,04) m s^{-1} and an air temperature of (22 ± 5) °C, but increase the smoke density to three times the response threshold recorded for alarm number 16 (m_{16} or y_{16}), when tested in accordance with 5.3.2. Using alarm number 16, with a supply voltage corresponding to that of a new battery, operate the alarm silence control, immediately insert the alarm into the smoke-filled smoke tunnel and maintain the smoke density between three and four times m_{16} or y_{16} for at least 15 min.

5.20.2.2 Repeat the test in 5.20.2.1 but with a supply voltage of V_E, as determined in 5.16.2.3.

5.20.2.3 With the supply voltage corresponding to that of a new battery, put alarm number 16 into the alarm silence condition by the operation of the alarm silence control. Measure the response threshold as described in 5.1.5 but with the smoke generation commencing (15 ± 0,25) min after the operation of the alarm silence control.

5.20.2.4 Repeat the test described in 5.20.2.3 but with a supply voltage of V_E, as determined in 5.16.2.3.

5.20.2.5 Repeat the test in 5.20.2.3 but, after operating the alarm silence control, hold the control on continuously for the remainder of the test.

5.20.3 Requirements

5.20.3.1 When tested in accordance with 5.20.2.1 and 5.20.2.2, the alarm shall not emit an alarm signal during the first 5 min after the alarm silence control is operated.

5.20.3.2 The ratio of the response thresholds measured in accordance with 5.20.2.3 and 5.20.2.4 to the response threshold recorded for alarm number 16 when tested in accordance with 5.4 shall be not less than 0,625 and not greater than 1,6.

5.20.3.3 When tested in accordance with 5.20.2.5 either:

a) within 15 min of the initial operation of the alarm silence control the alarm shall emit an audible signal (alarm or battery fault warning) for as long as the control is held on; or

b) the ratio of the response threshold measured during the test to the response threshold recorded for the same alarm when tested in accordance with 5.4 shall be not less than 0,625 and not greater than 1,6.

5.21 Variation in supply voltage

5.21.1 Object

To show that, within the specified range(s) of the supply voltage, the sensitivity of the smoke alarm is not unduly dependent on these parameters.

5.21.2 Test procedure

The response threshold value of the specimen to be tested shall be measured as described in 5.1.5, under the extremes of the specified supply conditions (e.g. maximum and minimum voltage).

For self-contained smoke alarms intended for operation from mains supplies, the alarm shall be tested with supply voltages of 0,85 times the lower limit and 1,1 times the upper limit of the nominal supply voltage range specified in the manufacturer's requirements. If the smoke alarm is provided with a rechargeable battery, sufficient time shall be allowed for the battery voltage to stabilize before the response threshold is measured.

For self-contained battery operated smoke alarms, the tests shall be carried out with a supply voltage corresponding to that of a new battery, and also at the fault voltage (V_E) as determined in 5.16.2.3. A smoke alarm with a standby battery (or equivalent) is also to be tested but with the primary supply disconnected.

For smoke alarms intended to operate from any external supply other than mains, the manufacturer shall specify a maximum and minimum voltage. Tests shall be conducted at the maximum and minimum voltage.

5.21.3 Requirements

The ratio of the response threshold values $y_{max} : y_{min}$ or $m_{max} : m_{min}$ shall not be greater than 1,6.

The lower response threshold value y_{min} shall not be less than 0,2 or m_{min} shall not be less than 0,05 dB m^{-1}.

5.22 Battery reversal

5.22.1 Object

To demonstrate the ability of the smoke alarm to function properly after being misconnected with respect to polarity.

5.22.2 Test procedure

Any user-replaceable batteries shall be fitted with reversed polarity for 10 s to 15 s, if it is possible to establish the reversed connection with the intended battery type, without causing mechanical damage to the smoke alarm.

Following the reverse polarity conditioning, the specimen shall be connected to its power source as described in 5.1.2 and its response threshold value measured as in 5.1.5.

Apply a voltage to the alarm of V_E as determined in 5.16.2 minus 5 %.

Of the two response threshold values for the specimen in this test and the initial sensitivity test, the greater shall be designated y_{max} or m_{max} and the lesser y_{min} or m_{min}.

5.22.3 Requirements

The ratio of the response threshold values $y_{max}:y_{min}$ or $m_{max}:m_{min}$ shall not be greater than 1,6. When voltage V_E minus 5 % is applied, the battery fault warning shall be given.

5.23 Back-up power source

5.23.1 Object

To demonstrate that the back-up power source is correctly monitored.

5.23.2 Test procedure

5.23.2.1 Low back-up

The test procedure set out in 5.16 shall be used to simulate the depletion of the back-up power source to the point where a low back-up warning is given.

5.23.2.2 Open circuit

The back-up power supply shall be disconnected or removed as appropriate and mains power applied to the unit.

5.23.2.3 Short-circuit

The back-up power supply shall be disconnected and replaced with a short-circuit between the back-up terminals and the mains power applied to the unit.

5.23.3 Requirements

When tested as described in 5.23.2.1, a low back-up signal shall be obtained both with mains power to the unit and without mains power to the unit.

When tested as described in 5.23.2.2, the smoke alarm shall give an audible warning.

When tested as described in 5.23.2.3, the smoke alarm shall give an audible warning.

5.24 Electrical safety – assessment and testing to determine the adequacy of personal protection against hazardous currents passing through the human body (electric shock), excessive temperature and the start and spread of fire

5.24.1 Marking

The apparatus shall be marked in accordance with EN 60065:2002, Clause 5.

NOTE The required markings may be on any external part of the apparatus but it is not necessary for the specified markings to be visible after installation.

For class I apparatus, the following information shall be given close to the mains input terminals:

"WARNING — THIS APPARATUS MUST BE EARTHED"

If live parts are made accessible when a cover is removed or opened, a warning shall be displayed which is visible before the cover is removed or opened.

5.24.2 Heating under normal operating conditions

The apparatus shall conform to the requirements of EN 60065:2002, Clause 7.

5.24.3 Shock hazard under normal operating conditions

The apparatus shall conform to the requirements of EN 60065:2002, Clauses 8 and 9 when mounted in any orientation on a vertical surface and when mounted on the underside of a horizontal surface.

NOTE The requirement of EN 60065:2002, 9.1.6 applies to the pins of an appliance inlet on the apparatus following withdrawal of the connector attached to the mains supply wires.

5.24.4 Insulation requirements

Apparatus intended to be operated from a supply greater than 34 V (peak or d.c.) shall conform to the requirements of EN 60065:2002, Clause 10 disregarding the test specified in 10.1 of that standard.

5.24.5 Fault conditions

The apparatus shall conform to the requirements of EN 60065:2002, Clause 11.

5.24.6 Mechanical strength

The apparatus shall conform to the requirements of EN 60065:2002, Clause 12 disregarding 12.1.1 of that standard.

5.24.7 Clearances and creepage distances

The apparatus shall conform to the requirements of EN 60065:2002, Clause 13.

5.24.8 Components

Resistors, capacitors, inductors and transformers, the short-circuiting or disconnecting of which would cause an infringement of the requirements for operation under fault conditions, in respect of overheating, fire or shock hazard, shall conform to the relevant requirements of EN 60065:2002, Clause 14.

Protective devices, switches, safety interlocks, voltage setting devices and the housing arrangements for batteries shall conform to the relevant requirements of EN 60065:2002, Clause 14.

The power, voltage and current ratings, as appropriate, of all components shall be suitable for the application in which they are used.

Conformity shall be checked by circuit measurement, analysis of the circuit design, measurements on the components in question and by inspection, as appropriate.

5.24.9 Protection against the start and spread of fire

The apparatus shall conform to the requirements of EN 60065:2002, Clause 20.

5.24.10 Parts connected to the supply mains

The apparatus shall comply with the requirements of Clause 13 of EN 60065:2002.

5.24.11 Wiring connections

The apparatus shall comply with the requirements of 3.1, 3.2, 3.3 and 3.4 of EN 60950-1:2001.

In these sub-clauses, reference to 2.9 and 5.1 shall be read as references to 9.3.5 and Clause 7 respectively of EN 60065:2002.

5.24.12 Resistance to the effects of heat and fire

The apparatus shall comply with the requirements of EN 60950-1:2001, 4.7, 4.7.1, 4.7.2, and 4.7.3

5.24.13 Definitions

For definitions of terms used in the clauses of EN 60065:2002 or EN 60950-1:2001 referred to above, reference shall be made to Clause 2 of EN 60065:2002 or 1.2 of EN 60950-1:2001 respectively.

Annex A
(normative)

Smoke tunnel for response threshold value measurements

The following specifies those properties of the smoke tunnel which are of primary importance for making repeatable and reproducible measurements of response threshold values of smoke alarms. However, since it is not practical to specify and measure all parameters which can influence the measurements, the background information in Annex K shall be carefully considered and taken into account when a smoke tunnel is designed and used to make measurements in accordance with this document.

The smoke tunnel shall have a horizontal working section containing a working volume. The working volume is a defined part of the working section where the air temperature and air flow are within the required test conditions. Conformity with this requirement shall be regularly verified under static conditions, by measurements at an adequate number of points distributed within and on the imaginary boundaries of the working volume. The working volume shall be large enough to fully enclose the smoke alarm to be tested and the sensing parts of the measuring equipment. The working section shall be designed to allow the dazzling apparatus described in Annex D to be inserted. The smoke alarm to be tested shall be mounted in its normal operating position on the underside of a flat board aligned with the airflow in the working volume. The board shall be of such dimensions that the edge(s) of the board are at least 20 mm from any part of the smoke alarm. The smoke alarm mounting arrangement shall not unduly obstruct the air flow between the board and the tunnel ceiling.

Means shall be provided for creating an essentially laminar air flow at the required velocities (i.e. (0,2 ± 0,04) m s^{-1} or (1,0 ± 0,2) m s^{-1}) through the working volume. It shall be possible to control the temperature at the required values and to increase the temperature at a rate not exceeding 1 K min^{-1} to 55 °C.

Both aerosol density measurements, *m* and *y*, shall be made in the working volume in the proximity of the smoke alarm.

Means shall be provided for the introduction of the test aerosol such that a homogeneous aerosol density is obtained in the working volume.

Only one smoke alarm shall be mounted in the tunnel, unless it has been demonstrated that measurements made simultaneously on more than one smoke alarm are in close agreement with measurements made by testing smoke alarms individually. In the event of a dispute the value obtained by individual testing shall be accepted.

Annex B
(normative)

Test aerosol for response threshold value measurements

A polydispersive aerosol shall be used as the test aerosol. The maximum of its particle size mass distribution shall be between 0,5 µm and 1 µm. The refractive index of the aerosol particles shall be approximately 1,4.

The test aerosol shall be generated, reproducible and stable with regard to the following parameters:

— particle size distribution;

— optical constants of the particles;

— particle shape;

— particle structure.

The stability of the aerosol shall be ensured. One possible method to ensure that the aerosol is stable is to measure the ratio $m : y$.

It is recommended that an aerosol generator producing a paraffin oil mist is used as the test aerosol (e.g. liquid paraffin which is used for pharmaceutical purposes).

Annex C
(normative)

Smoke measuring instruments

C.1 Obscuration meter

The response threshold of smoke alarms using scattered light or transmitted light is characterized by the absorbance index (extinction module) of the test aerosol, measured in the proximity of the smoke alarm, at the moment that it generates an alarm signal.

The absorbance index is designated *m* and given the units of decibels per metre (dB m^{-1}). The absorbance index *m* is given by the following equation:

$$m = \frac{10}{d} \log \left(\frac{P_0}{P}\right) \quad \mathrm{dB\ m^{-1}}$$

where:

d is the distance, in metres, travelled by the light in the test aerosol or smoke, from the light source to the light receiver;

P_0 is the radiated power received without test aerosol or smoke;

P is the radiated power received with test aerosol or smoke.

For all aerosol or smoke concentrations up to 2 dB m^{-1}, the measuring error of the obscuration meter shall not exceed 0,02 dB m^{-1} + 5 % of the measured aerosol or smoke concentration.

The optical system shall be arranged so that any light scattered by more than 3° by the test aerosol or smoke is disregarded by the light smoke alarm.

The effective radiated power[2)] of the light beam shall be as follows:

a) at least 50 % shall be within a wavelength range from 800 nm to 950 nm;

b) not more than 1 % shall be in the wavelength range below 800 nm; and

c) not more than 10 % shall be in the wavelength range above 1 050 nm.

---

2) The effective radiated power in each wavelength range is the product of the power emitted by the light source, the transmission level of the optical measuring path in clean air and the sensitivity of the receiver, within this wavelength range.

C.2 Measuring ionization chamber (MIC)

C.2.1 General

The response threshold of smoke alarms using ionization is characterized by a non-dimensional quantity *y* which is derived from the relative change of the current flowing in a measuring ionization chamber, and which is related to the particle concentration of the test aerosol, measured in the proximity of the smoke alarm, at the moment that it generates an alarm signal.

C.2.2 Operating method and basic construction

The mechanical construction of the measuring ionization chamber is shown in Annex M.

The measuring device consists of a measuring chamber, an electronic amplifier and a method of continuously sucking in a sample of the aerosol or smoke to be measured.

The principle of operation of the measuring ionization chamber is shown in Figure C.1. The measuring chamber contains a measuring volume and a suitable means by which the sampled air is sucked in and passes the measuring volume in such a way that the aerosol/smoke particles diffuse into this volume. This diffusion is such that the flow of ions within the measuring volume is not disturbed by air movements.

The air within the measuring volume is ionized by alpha radiation from an americium radioactive source, such that there is a bipolar flow of ions when an electrical voltage is applied between the electrodes. This flow of ions is affected by the aerosol or smoke particles in a known manner. The relative variation in the current of ions is used as a measurement of the aerosol or smoke concentration.

The measuring chamber is so dimensioned and operated that the following relationships apply:

$$Z \times \bar{d} = \eta \times y \quad \text{and} \quad y = \left(\frac{I_0}{I}\right) - \left(\frac{I}{I_0}\right)$$

where

I_0 is the chamber current in air without test aerosol or smoke;

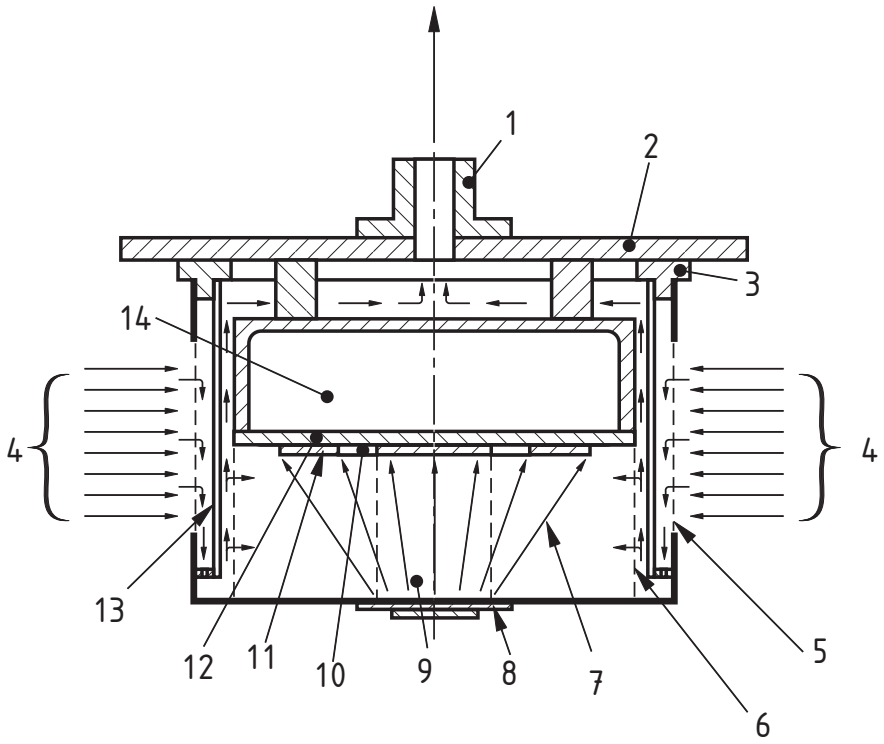
I is the chamber current in air with test aerosol or smoke;

η is the chamber constant;

Z is the particle concentration in particles per m^3;

$\bar{d}$ is the mean particle diameter.

The non-dimensional quantity *y*, which is approximately proportional to the particle concentration for a particular type of aerosol or smoke, is used as a measure of response threshold value for smoke alarms using ionization.



Key

1 Suction nozzle
2 Assembly plate
3 Insulating ring
4 Air/smoke entry
5 Outer grid
6 Inner grid
7 α rays
8 α source
9 Measuring volume
10 Measuring electrode
11 Guard ring
12 Insulating material
13 Windshield
14 Electronics

Figure C.1 — Measuring ionization chamber - method of operation

C.2.3 Technical data

a) Radiation source:

Isotope	Americium Am^{241};
Activity	130 kBq (3,5 μCi) ± 5 %;
Average α energy	4,5 MeV ± 5%;
Mechanical construction	Americium oxide embedded in gold between two layers of gold. Covered with a hard gold alloy. The source is in the form of a circular disc with a diameter of 27 mm, which is mounted in a holder such that no cut edges are accessible.

b) Ionization chamber

The chamber impedance (i.e. the reciprocal of the slope of the current vs voltage characteristic of the chamber in its linear region (chamber current ≤ 100 pA)) shall be $1{,}9 \times 10^{11}$ Ω ± 5 %, when measured in aerosol- and smoke-free air at:

pressure	(101,3 ± 1) kPa;
temperature	(25 ± 2) °C;
relative humidity	(55 ± 20) %;

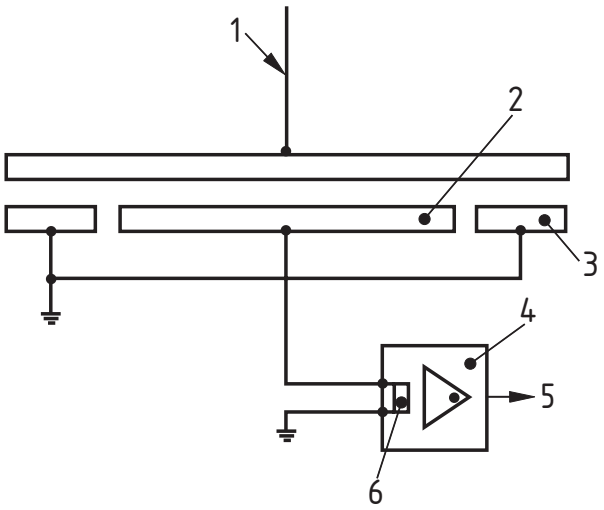
with the potential of the guard ring within ± 0,1 V of the voltage of the measuring electrode.

c) Current measuring amplifier

The chamber is operated in the circuit shown in Figure C.2, with the supply voltage such that the chamber current between the measuring electrodes is 100 pA in aerosol- or smoke-free air. The input impedance of the current measuring device shall be < 10^9 Ω.

d) Suction system

The suction system shall draw air through the device at a continuous steady flow of 30 l min^{-1} ± 10 % at atmospheric pressure.



Key

1 Supply voltage
2 Measuring electrode
3 Guard ring
4 Current measuring amplifier
5 Output voltage proportional to chamber current
6 Input impedance, Z_{in} < 1 x 10^9 Ω

Figure C.2 — Measuring ionization chamber - operating circuit

Annex D
(normative)

Apparatus for dazzling test

The apparatus (see Figure D.1) shall be constructed so that it can be inserted in the working section of the smoke tunnel and there occupy just one flue section. It is cube-shaped. Four of the cube faces are closed and lined on the inside with high gloss aluminium foil; two opposing cube faces are open so that the test smoke can flow through the device. Circular fluorescent lamps (32 W) with a diameter of approximately 300 mm are fitted to the closed surfaces of the cube (type "Warm White", approximate colour temperature: 2 800 K). The tubes shall not cause turbulence in the tunnel.

To obtain a stable output of light tubes shall be aged for 100 h and discarded at 2 000 h.

The smoke alarm to be tested shall be installed in the centre of the upper cube face (see Figure D.1) so that the light can play on it from above, below and from two sides. The electrical connections of the fluorescent lamps shall be such that there can be no interference with the detection system through electrical signals.

Dimensions in millimetres

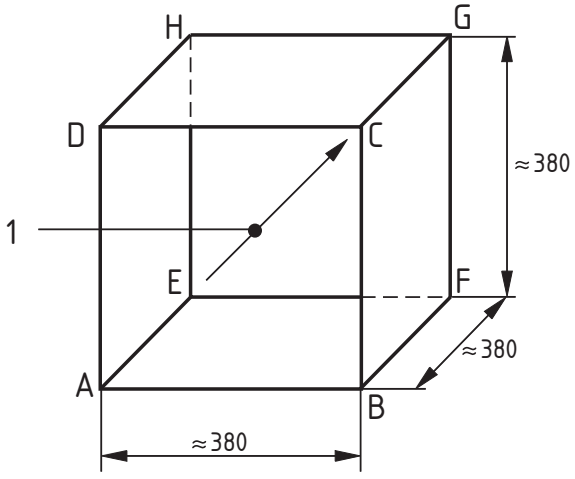


Figure a)

Sides ABCD and EFGH shall be open to allow for the flow of aerosol.

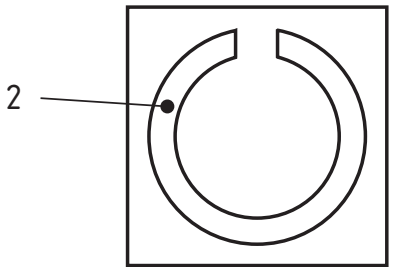


Figure b)

Sides ABFE, AEHD, BFGC and DCGH shall have lamps mounted as shown in Figure b).

Key
1 Stream of aerosol
2 Fluorescent lamp

Figure D.1 — Dazzling apparatus

Annex E
(informative)

Apparatus for impact test

The apparatus (see Figure E.1) consists essentially of a swinging hammer comprising a rectangular section head (striker), with a chamfered impact face, mounted on a tubular steel shaft. The hammer is fixed into a steel boss, which runs on ball bearings on a fixed steel shaft mounted in a rigid steel frame, so that the hammer can rotate freely about the axis of the fixed shaft. The design of the rigid frame is such as to allow complete rotation of the hammer assembly when the specimen is not present.

The striker is of dimensions 76 mm wide $\times$ 50 mm deep $\times$ 94 mm long (overall dimensions) and is manufactured from aluminium alloy (AlCu4SiMg) to EN 573-3 solution treated and precipitation treated condition. It has a plane impact face chamfered at (60 ± 1)° to the long axis of the head. The tubular steel shaft has an outside diameter of (25 ± 0,1) mm with walls (1,6 ± 0,1) mm thick.

The striker is mounted on the shaft so that its long axis is at a radial distance of 305 mm from the axis of the rotation of the assembly, the two axes being mutually perpendicular. The central boss is 102 mm in outside diameter and 200 mm long and is mounted coaxially on the fixed steel pivot shaft, which is approximately 25 mm in diameter. However, the precise diameter of the shaft will depend on the bearings used.

Diametrically opposite the hammer shaft are two steel counter balance arms, each 20 mm in outside diameter and 185 mm long. These arms are screwed into the boss so that a length of 150 mm protrudes. A steel counter balance weight is mounted on the arms so that its position can be adjusted to balance the weight of the striker and arms, as in Figure E.1. On the end of the central boss is mounted a 12 mm wide x 150 mm in diameter aluminium alloy pulley and round this an inextensible cable is wound, one end being fixed to the pulley. The other end of the cable supports the operating weight.

The rigid frame also supports the mounting board on which the specimen is mounted by its normal fixings. The mounting board is adjustable vertically so that the centre of the impact face of the hammer will strike the specimen when the hammer is moving horizontally, as shown in Figure E.1.

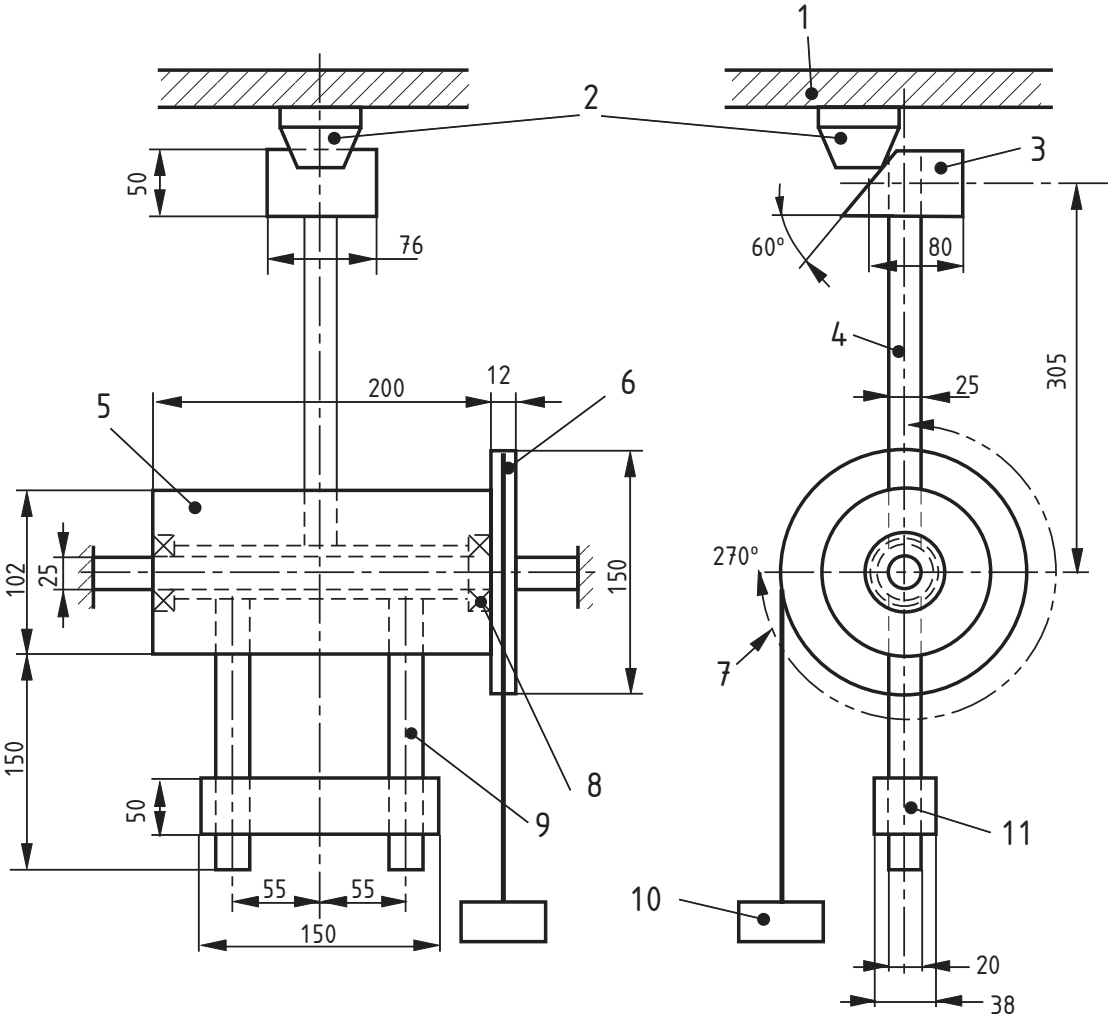
To operate the apparatus the position of the specimen and the mounting board is first adjusted as shown in Figure E.1 and the mounting board is then secured rigidly to the frame. The hammer assembly is then balanced carefully by adjustment of the counter balance weight with the operating weight removed. The hammer arm is then drawn back to the horizontal position ready for release and the operating weight is reinstated. On release of the assembly the operating weight will spin the hammer and arm through an angle of $3\pi/2$ radians to strike the specimen. The mass (m) of the operating weight to produce the required impact energy of 1,9 J is given by the following equation:

$$m = \frac{0{,}388}{3\pi r}\,\mathrm{kg}$$

where *r* is the effective radius of the pulley in metres. This equals approximately 0,55 kg for a pulley radius of 75 mm.

As the standard calls for a hammer velocity at impact of (1,5 ± 0,125) m s^{-1}, the mass of the hammer head will need to be reduced by drilling the back face sufficiently to obtain this velocity. It is estimated that a head of mass of about 0,79 kg will be required to obtain the specified velocity, but this will have to be determined by trial and error.

Dimensions in millimetres, with a tolerance of ± 5 %



Key

1 Mounting board
2 Specimen
3 Striker
4 Striker shaft
5 Boss
6 Pulley
7 270° angle of movement
8 Ball bearings
9 Counter balance arms
10 Operating weight
11 Counter balance weight

Dimensions in mm, with a tolerance of ± 5 %.

NOTE The sizes given to the dimensions (except for the striker) are for guidance only.

Figure E.1 — Impact apparatus

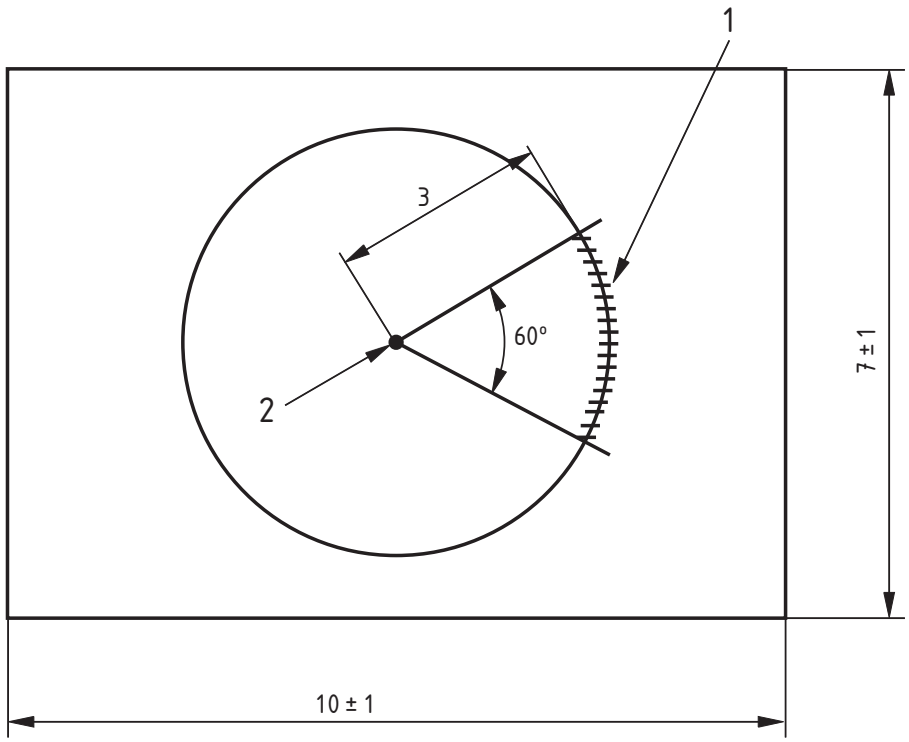
Annex F
(normative)

Fire test room

The specimens to be tested, the measuring ionization chamber (MIC), the temperature probe and the measuring part of the obscuration meter shall all be located within the volume shown in Figures F.1 and F.2.

The specimens, the MIC and the mechanical parts of the obscuration meter shall be at least 100 mm apart, measured to the nearest edges. The centre line of the beam of the obscuration meter shall be at least 35 mm below the ceiling.

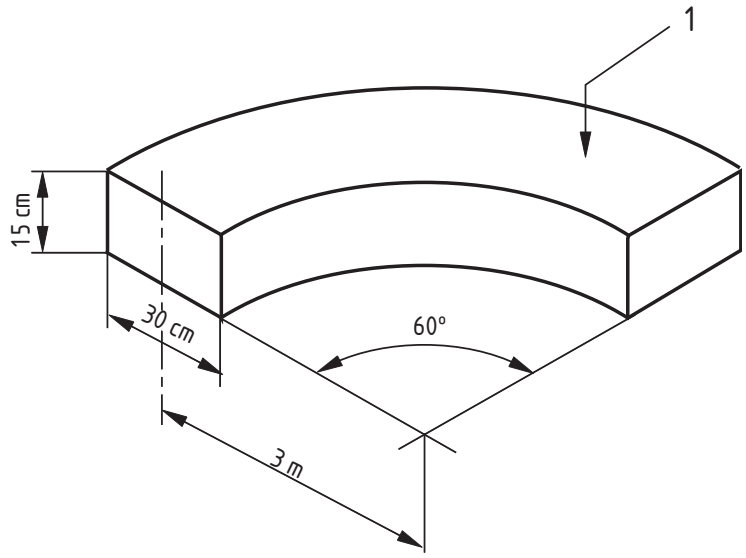
Dimensions in metres



Key

1 Specimens and measuring instruments
2 Position of test fire
3 Position of wall mounted smoke alarms.

Figure F.1 — Plan view of fire test room and position of smoke alarms and measuring instruments



Key

1 Ceiling

Figure F.2 — Mounting positions for instruments and specimens

Annex G
(normative)

Smouldering pyrolysis wood fire (TF2)

G.1 Fuel

Approximately 10 dried beech wood sticks (moisture content ≈ 5 %), each stick having dimensions of approximately 75 mm × 25 mm × 20 mm.

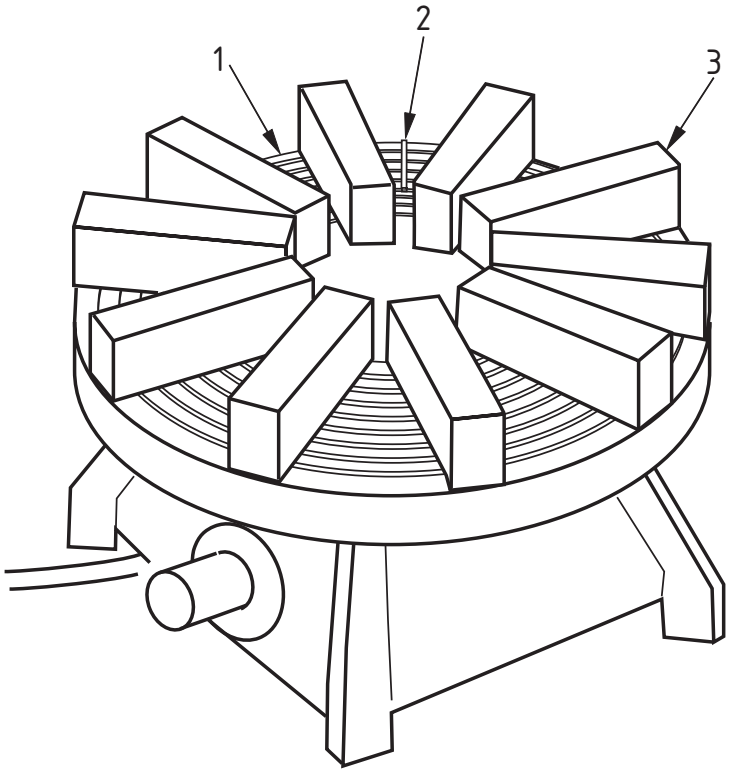
G.2 Hotplate

The hotplate shall have a 220 mm diameter grooved surface with 8 concentric grooves, each being 2 mm deep and 5 mm wide, with the outer groove 4 mm from the edge and a distance of 3 mm between grooves. The hotplate shall have a rating of approximately 2 kW.

The temperature of the hotplate surface shall be measured by a sensor attached to the fifth groove, counted from the edge of the hotplate, and secured to provide a good thermal contact.

G.3 Arrangement

The sticks shall be arranged on the grooved hotplate surface, with the 20 mm side in contact with the surface in such a way that the temperature probe lies between the sticks and is not covered, as shown in Figure G.1.



Key

1 Hot plate
2 Temperature sensor
3 Wooden sticks

Figure G.1 — Arrangement of the sticks on the hotplate

G.4 Heating rate

The hotplate shall be powered in such a way that its temperature rises from ambient to 600 °C in approximately 11 min.

G.5 End of test condition

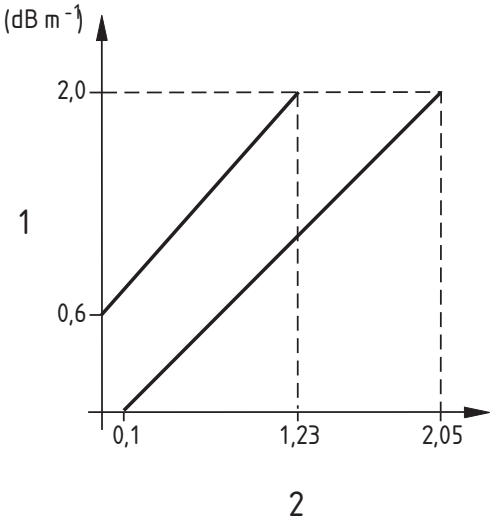
The test is ended when:

m_E = 2 dBm^{-1}.

G.6 Test validity criteria

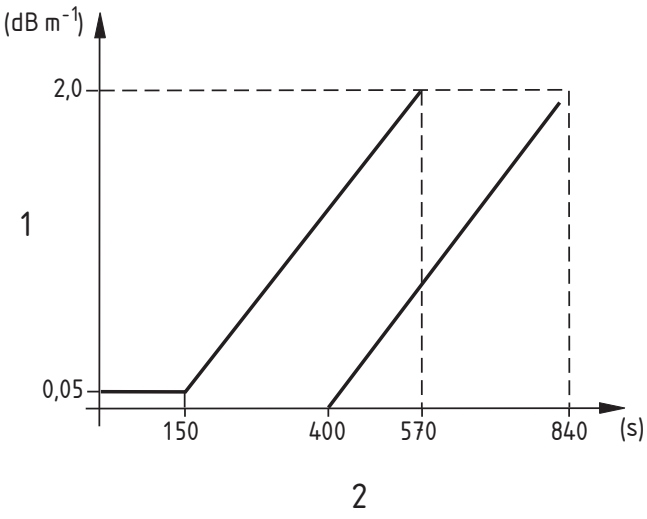
The development of the fire shall be such that the curves of m against y, and m against time, fall within the limits shown in Figures G.2 and G.3 respectively and no flaming occurs, up to the time when all of the specimens have generated an alarm signal, or m = 2 dBm^{-1}, whichever is the earlier.

If the end of test condition, m_E = 2 dBm^{-1}, is reached before all the specimens of ionization type smoke alarms have responded, then the test is only considered valid if a y-value of 1,6 has been reached.



Key
1 *m*-value (dB/m)
2 *y*-values

Figure G.2 — Limits for m against y, Fire TF2



Key
1 *m*-value (dB/m)
2 Time (s)

Figure G.3 — Limits for m against time, Fire TF2

Annex H
(normative)

Glowing smouldering cotton fire (TF3)

H.1 Fuel

Approximately 90 pieces of woven cotton wick, each approximately 800 mm long and weighing approximately 3 g. The wicks shall be free from any protective coating and shall be washed and dried if necessary.

H.2 Arrangement

The wicks shall be fastened to a ring approximately 100 mm in diameter and suspended approximately 1 m above a non-combustible plate as shown in Figure H.1.

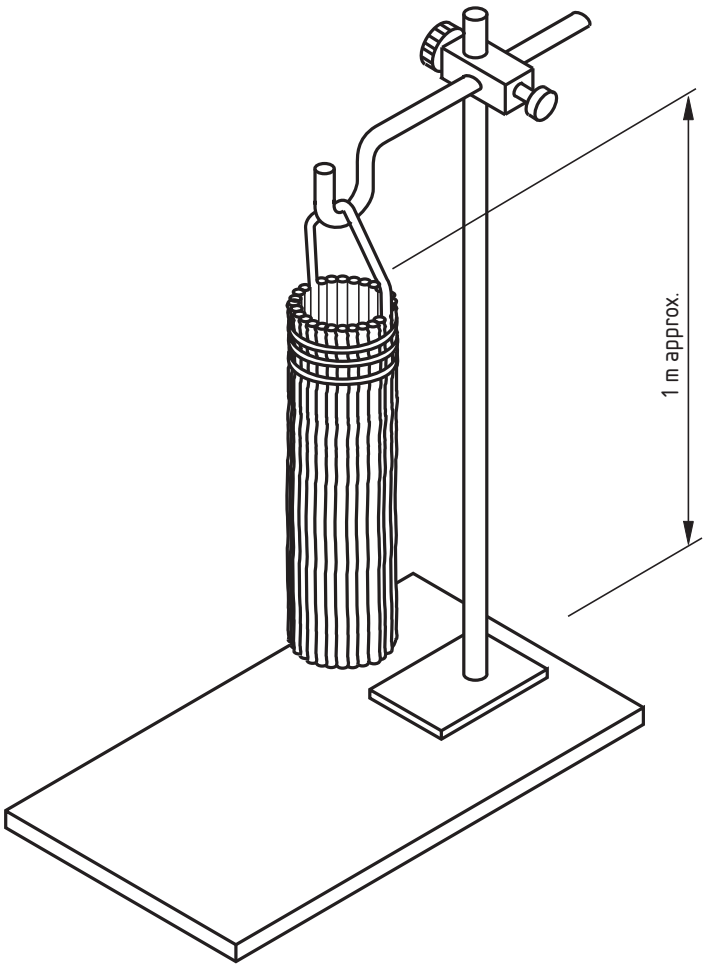


Figure H.1 — Arrangement of the cotton wicks

H.3 Ignition

The lower end of each wick shall be ignited so that the wicks continue to glow. Any flaming shall be blown out immediately. The test time shall start when all wicks are glowing.

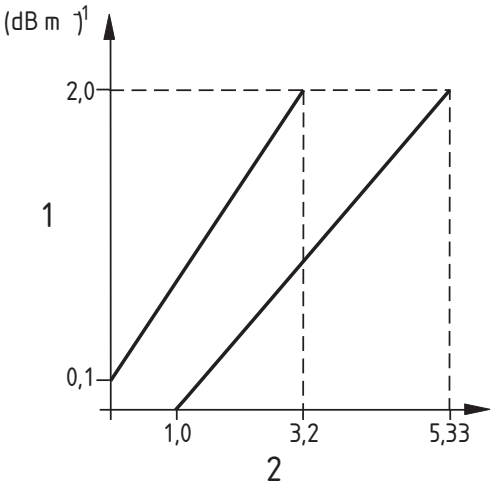
H.4 End of test condition

The test is ended when:

m_E = 2 dBm^{-1}.

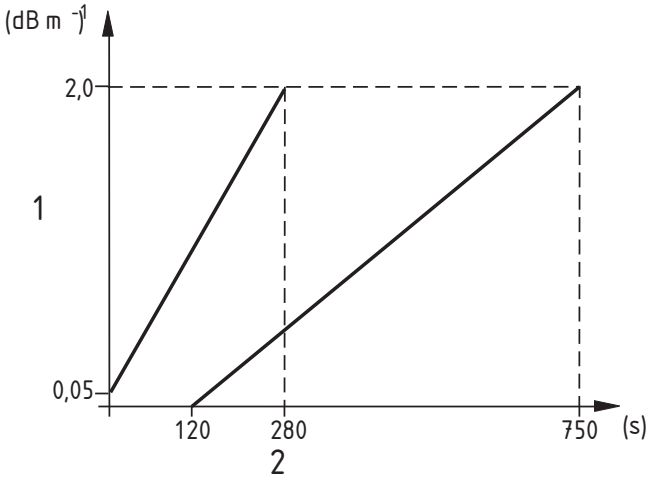
H.5 Test validity criteria

The development of the fire shall be such that the curves of *m* against *y*, and *m* against time, fall within the limits shown in Figures H.2 and H.3 respectively, up to the time when all of the specimens have generated an alarm signal, or *m* = 2 dB m^{-1}, whichever is the earlier.



Key
1 *m*-value (dB/m)
2 *y*-values

Figure H.2 — Limits for m against y, Fire TF3



Key
1 *m*-value (dB/m)
2 Time (s)

Figure H.3 — Limits for m against time, Fire TF3

Annex I
(normative)

Flaming plastics (polyurethane) fire (TF4)

I.1 Fuel

Soft polyurethane foam, without flame retardant additives and having a density of approximately 20 kg m^{-3}. Three mats approximately 500 mm × 500 mm × 20 mm are usually found sufficient, however the exact fuel quantity may be adjusted to obtain valid tests.

I.2 Arrangement

The mats shall be placed one on top of another on a base formed from aluminium foil with the edges folded up to provide a tray.

I.3 Ignition

The mats shall normally be ignited at a corner of the lower mat, however the exact position of ignition may be adjusted to obtain valid tests. A small quantity of a clean burning material (e.g. 5 cm^3 of methylated spirit) may be used to assist the ignition.

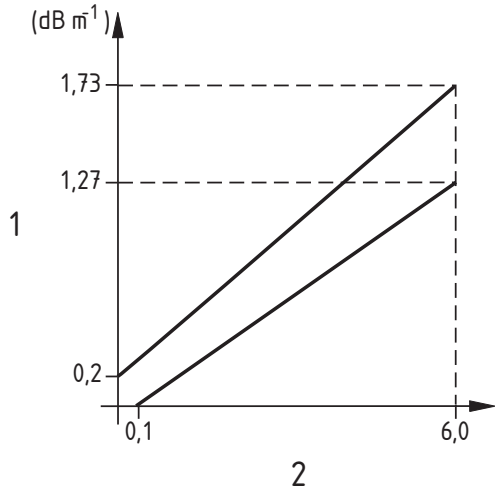
I.4 End of test condition

The test is ended when:

$y_E = 6$.

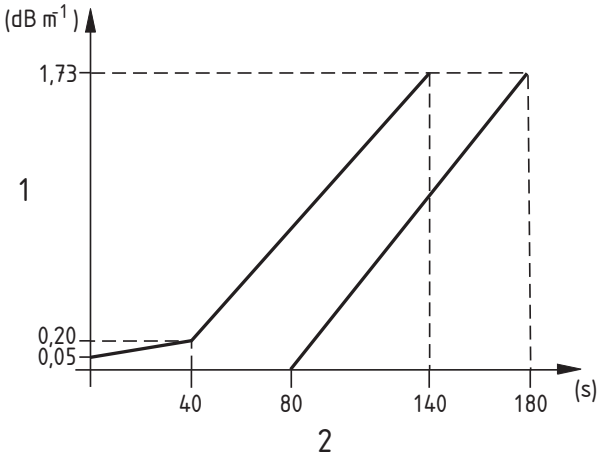
I.5 Test validity criteria

The development of the fire shall be such that the curves of m against y, and m against time, fall within the limits shown in Figures I.1 and I.2 respectively, up to the time when all of the specimens have generated an alarm signal, or $y = 6$, whichever is the earlier.



Key
1 *m*-value
2 *y*-value

Figure I.1 — Limits for m against y, Fire TF4



Key
1 *m*-value
2 Time

Figure I.2 — Limits for m against time, Fire TF4

Annex J
(normative)

Flaming liquid (n-heptane) fire (TF5)

J.1 Fuel

Approximately 650 g of a mixture of n-heptane (purity ≥ 99 %) with approximately 3 % of toluene (purity ≥ 99 %), by volume. The precise quantities may be varied to obtain valid tests.

J.2 Arrangement

The heptane/toluene mixture shall be burnt in a square steel tray with dimensions approximately 330 mm × 330 mm × 50 mm.

J.3 Ignition

Ignition shall be by flame or spark.

J.4 End of test condition

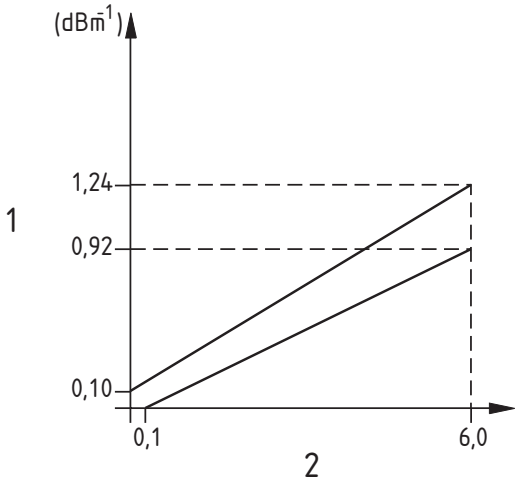
The test is ended when:

$y_E = 6$.

J.5 Test validity criteria

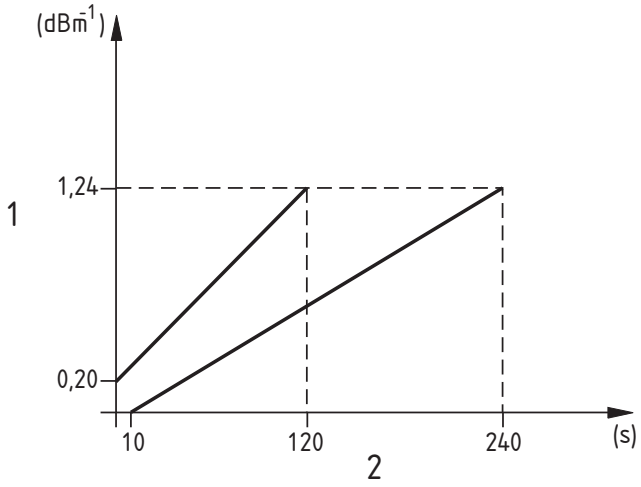
The development of the fire shall be such that the curves of m against y, and m against time, fall within the limits shown in Figures J.1 and J.2 respectively, up to the time when all of the specimens have generated an alarm signal, or $y = 6$, whichever is earlier.

If the end of test condition, $y_E = 6$, is reached before all the specimens of smoke alarms using scattered or transmitted light have responded, then the test is only considered valid if an m-value of 1,1 dB m^{-1} has been reached.



Key
1 *m*-value
2 *y*-value

Figure J.1 — Limits for m against y, Fire TF5



Key
1 *m*-value
2 Time

Figure J.2 — Limits for m against time, Fire TF5

Annex K
(informative)

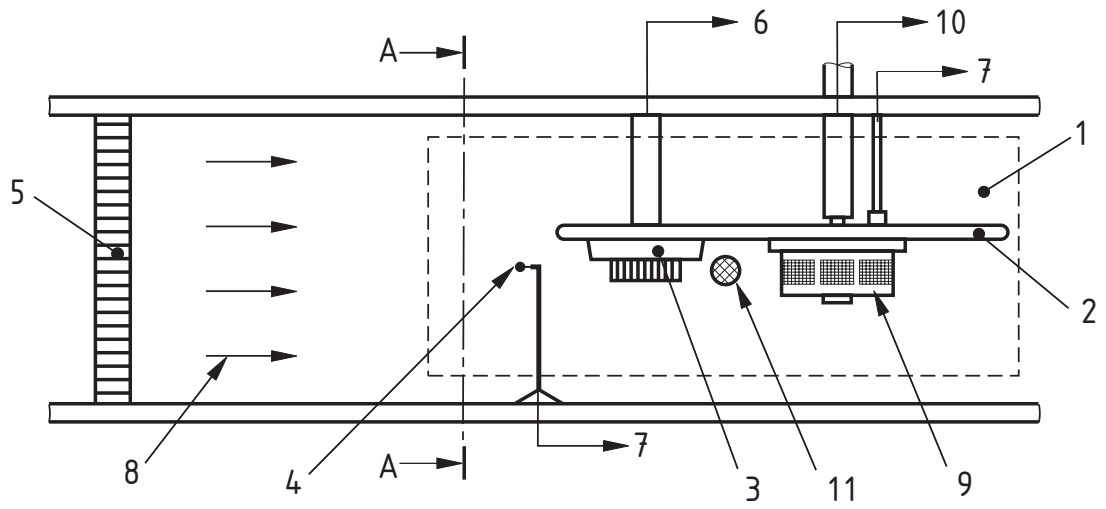
Information concerning the construction of the smoke tunnel

Smoke detectors respond when the signal(s) from one or more smoke sensors fulfil certain criteria. The smoke concentration at the sensor(s) is related to the smoke concentration surrounding the detector but the relationship is usually complex and dependent on several factors, such as orientation, mounting, air velocity, turbulence and the rate of rise of smoke density. The relative change of the response threshold value measured in the smoke tunnel is the main parameter considered when the stability of smoke detectors is evaluated by testing in accordance with this document.

Many different smoke tunnel designs are suitable for the tests specified in this document but the following points should be considered when designing and characterising a smoke tunnel.

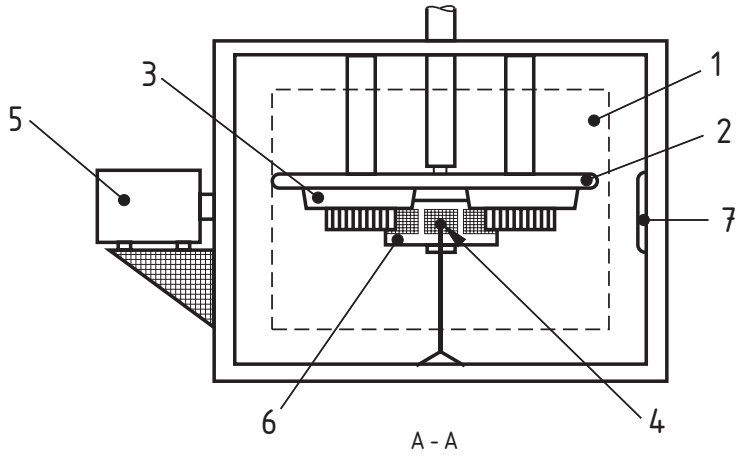
The response threshold value measurements require increasing aerosol density until the detector responds. This can be facilitated in a closed circuit smoke tunnel. A purging system is required to purge the smoke tunnel after each aerosol exposure.

The air flow created by a fan in the tunnel will be turbulent and needs to pass through an air straightener to create a nearly laminar and uniform air flow in the working volume (see Figures K.1 and K.2). This can be facilitated by using a filter, honeycomb or both, in line with, and upstream of, the working section of the tunnel. If a filter is used it should be coarse enough to let the aerosol pass. Care should be taken to ensure that the airflow is well mixed to give a uniform temperature and aerosol density before entering the flow straightener. Efficient mixing can be obtained by feeding the aerosol to the tunnel upstream of the fan.



Key
1 Working volume
2 Mounting board
3 Detector(s) under test
4 Temperature sensor
5 Flow straightener
6 Supply and monitoring equipment
7 Control and measuring equipment
8 Air flow
9 MIC, measuring ionization chamber
10 MIC suction
11 Obscuration meter

Figure K.1 — Smoke tunnel, working section, side view



Key

1 Working volume
2 Mounting board
3 Detector(s) under test
4 Temperature sensor
5 Obscuration meter
6 MIC, measuring ionization chamber
7 Reflector for obscuration meter

Figure K.2 — Smoke tunnel, working section, cross section A-A

Means for heating the air before it enters the working section are required. The tunnel should have a system capable of controlling the heating so as to achieve the specified temperatures and temperature profiles in the working volume. The heating should be achieved by means of low temperature heaters to avoid the production of extraneous aerosols or alteration of the test aerosol.

Special attention should be given to the arrangement of the elements in the working volume in order to avoid disturbance of the test conditions e.g. due to turbulence. The suction through the MIC creates a mean air velocity of approximately 0,04 m s^{-1} in the plane of the entrance openings in the chamber housing. However, the effect of the suction will be negligible if the MIC is placed 10 cm to 15 cm downstream of the detector position.

The smoke tunnel may be designed for aerosol-free wind exposures with 5 m s^{-1} and 10 m s^{-1}, provided this does not interfere with the operation when the tunnel is used for response threshold value measurements.

Annex L
(normative)

Alarms suitable for installation in leisure accommodation vehicles (LAVs)

L.1 Temperature cycle test

L.1.1 Method of test

After the test in 5.13 has been conducted, stabilize the alarm at (25 ± 2) °C and apply the following temperature cycle 10 times.

a) Raise the temperature to (65 ± 2) °C in (2 ± 0,5) h.

b) Hold the temperature at (65 ± 2) °C until 8,5 h after the beginning of the cycle.

c) Reduce the temperature to (–10 ± 2) °C in (4 ± 1) h.

d) Hold the temperature at (–10 ± 2) °C until 19,5 h after the beginning of the cycle.

e) Increase the temperature to (25 ± 2) °C in (2 ± 0,5) h.

f) Hold the temperature at (25 ± 2) °C until 24 h after the beginning of the cycle.

After this temperature cycle conditioning has been applied, measure the response threshold of the smoke alarm in accordance with 5.13.

L.1.2 Requirements

The specimen shall not emit an alarm signal during the conditioning at –10 °C (see L.1.1.d).

The ratio of the response threshold measured in accordance with L.1.1 to the response threshold measured in accordance with 5.3 shall not be less than 0,625 and not greater than 1,6.

Annex M
(informative)

Information concerning the construction of the measuring ionization chamber

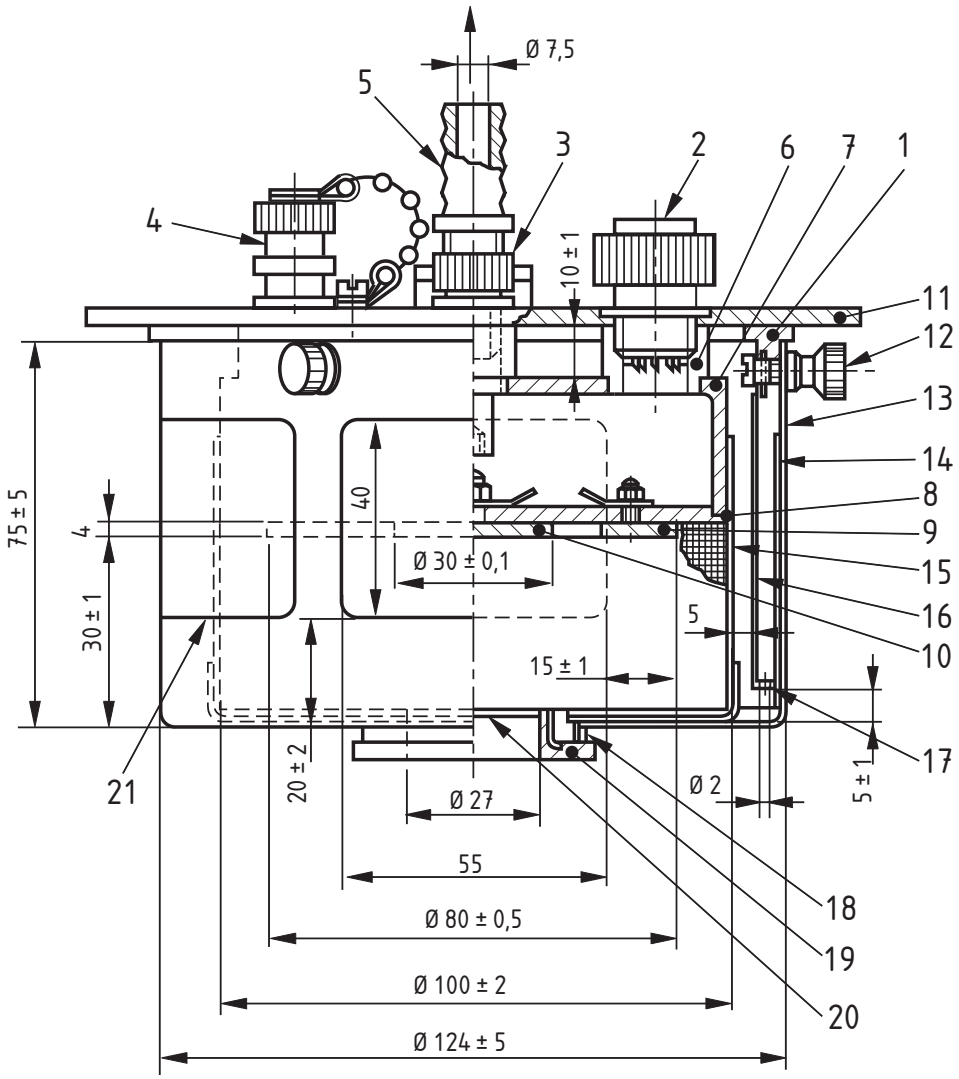
The mechanical construction of the measuring ionisation chamber[3)] is shown in Figure M.1. The functionally important dimensions are marked with their tolerances. Further details of the various parts of the device are given in Table M.1.

Table M.1 — List of parts of the measuring ionization chamber

Reference No.	Item	Number provided	Dimensions, Special features	Material
1	Insulating ring	1		Polyamide
2	Multi-pole socket	1	10-pole	
3	Measuring electrode terminal	1	To chamber supply	
4	Measuring electrode terminal	1	To amplifier or current measuring device	
5	Suction nozzle	1		
6	Guide socket	4		Polyamide
7	Housing	1		Aluminium
8	Insulating plate	1		Polycarbonate
9	Guard ring	1		Stainless steel
10	Measuring electrode	1		Stainless steel
11	Assembly plate	1		Aluminium
12	Fixing screw with milled nut	3	M3	Nickel plated brass
13	Cover	1	Six openings	Stainless steel
14	Outer grid	1	Wire 0,2 mm diameter 0,8 mm internal mesh width	Stainless steel
15	Inner grid	1	Wire 0,4 mm diameter 1,6 mm internal mesh width	Stainless steel
16	Windshield	1		Stainless steel
17	Intermediate ring	1	With 72 equispaced holes each 2 mm diameter	
18	Threaded ring	1		Nickel plated brass
19	Source holder	1		Nickel plated brass
20	Source	1	27 mm diameter	See C.2.3
21	Openings on the periphery	6		

3) The measuring ionization chamber is fully described in "Investigation of ionization chamber for reference measurements of smoke density" by M. Avlund, published by DELTA Electronics, Venlighedsvej 4, DK-2970 Hørsholm, Denmark.

Dimensions in millimetres



NOTE 1 See Table M.1 for the list of parts

NOTE 2 Dimensions without a tolerance marked are recommended dimensions.

Figure M.1 — Mechanical construction of the measuring ionization chamber

Annex ZA
(informative)

Clauses addressing the provisions of the EU Construction Products Directive (89/106/EEC)

ZA.1 Scope and relevant clauses

This European Standard has been prepared under the mandate M/109 given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in this annex, meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness (as defined by the Construction Products Directive) of the construction product covered by this European Standard for its intended use according to Clause 1 (Scope) of this standard; reference shall be made to the information given with the CE marking (see Clause ZA.3).

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). These requirements need also to be complied with, when and where they apply. An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://europa.eu.int)

This Annex ZA has the same scope, in relation to the products covered, as Clause 1 of this standard, except that it does not cover alarms used in vehicles. This annex establishes the conditions for the CE marking of smoke alarms intended for the use shown below and identifies the relevant clauses applicable.

Construction Product:	Smoke alarms
Intended use:	Fire safety

Table ZA.1 — Relevant clauses

Essential characteristics	Clauses in this European Standard	Mandated level(s)	Notes
Nominal activation conditions/ Sensitivity, Response delay (response time) and Performance under fire condition	4.12, 4.18, 5.2, 5.3, 5.4, 5.5, 5.6, 5.15, 5.17, 5.18, 5.19, 5.20	None	(1)
Operational reliability	4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.13, 4.14, 4.15, 4.16, 4.17, 4.19, 5.11, 5.16, 5.22, 5.23, 5.24		
Tolerance to supply voltage	5.21		
Durability of operational reliability and response delay, temperature resistance	5.7, 5.8		
Durability of operational reliability, vibration resistance	5.12, 5.13		
Durability of operational reliability, humidity resistance	5.9		
Durability of operational reliability, corrosion resistance	5.10		
Durability of operational reliability, electrical stability	5.14		
(1) The products covered by this standard are assumed to operate, in an event of fire, before the fire becomes so large as to affect their functioning. There is therefore no requirement to function when exposed to direct attack from fire.			

ZA.2 Procedures for the attestation of conformity of smoke alarms covered by this standard

ZA.2.1 System of attestation of conformity

The mandate requires that the attestation of conformity system to be applied shall be that shown in Table ZA. 2.

Table ZA.2 — Attestation of conformity system

Product	Intended use	Levels or classes	Attestation of conformity system
Fire detection/Fire alarm: smoke alarms	Fire safety	None	1
System 1: See CPD Annex III.2.(i), without audit-testing of samples			

ZA.2.2 Evaluation of conformity

ZA.2.2.1 General

The evaluation of conformity of the product with the requirements of the European Standard in question shall be demonstrated by:

a) Tasks to be performed by the manufacturer:

1) factory production control;

2) testing of samples by the manufacturer in accordance with a prescribed test plan.

b) Tasks to be undertaken under the responsibility of a Notified Product Certification Body:

1) type testing of the product;

2) initial inspection of the factory and factory production control;

3) periodic surveillance, assessment and approval of the factory production control.

NOTE The manufacturer is a natural or legal person, who places the product on the market under his own name. Normally, the manufacturer designs and manufactures the product himself. As a first alternative, he may have it designed, manufactured, assembled, packed, processed or labelled by subcontracting. As a second alternative he may assemble, pack, process, or label ready-made products.

The manufacturer shall ensure:

— that the initial type testing in accordance with this European Standard is initiated and carried out (under the responsibility of a notified product certification body); and

— that the product continuously complies with the initial type testing samples, for which compliance with this European Standard has been verified.

He shall always retain the overall control and shall have the necessary competence to take the responsibility for the product. The manufacturer shall be fully responsible for the conformity of the product to all relevant regulatory requirements.

ZA.2.2.2 Type testing

ZA.2.2.2.1 Type testing shall be performed to demonstrate conformity with this European Standard.

Type testing of the product shall be carried out in accordance with the clauses shown in Table ZA.1, except as described in ZA.2.2.2.2 and ZA.2.2.2.3.

ZA.2.2.2.2 Tests previously performed, such as type tests for product certification, may be taken into account providing that they were made to the same or a more rigorous test method under the same system of attestation of conformity as required by this standard on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE Same system of attestation of conformity means testing by an independent third party under the responsibility of a product certification body which is now a notified product certification body.

ZA.2.2.2.3 Where one or more characteristics are the same for products with similar design, construction and functionality then the results of tests for these characteristics on one product may be applied to the other similar product or products.

ZA.2.2.2.4 Test samples shall be representative of the normal production. If the test samples are prototypes, they shall be representative of the intended future production and shall be selected by the manufacturer.

NOTE In the case of prototypes and third party certification, this means that it is the manufacturer not the product certification body who is responsible for selecting the samples. During the initial inspection of the factory and of the factory production control (see ZA.2.2.3.4) it is verified, that the type tested samples are representative of the product being produced.

ZA.2.2.2.5 All type testing and its results shall be documented in a test report. All test reports shall be retained by the manufacturer for at least ten years after the last date of production of the product to which they relate.

ZA.2.2.3 Factory production control

ZA.2.2.3.1 General

FPC is the permanent internal control of production exercised by the manufacturer.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.

Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the conformity of the product with its technical specifications. Its implementation may be achieved by controls and tests on measuring equipment, raw materials and constituents, processes, machines and manufacturing equipment and finished products, including material properties in components, and by making use of the results thus obtained.

NOTE The FPC system may be part of a Quality Management system, e.g. in accordance with EN ISO 9001:2000.

ZA.2.2.3.2 General requirements

The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform to the stated performance characteristics and the samples subjected to type testing.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard. If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question. The manufacturer who subcontracts all of his activities may in no circumstances pass these responsibilities on to a subcontractor.

The FPC system shall fulfil the requirements as described in the following clauses of EN ISO 9001: 2000, where applicable:

— 4.2 except 4.2.1a);

— 5.1 e), 5.5.1, 5.5.2;

— Clause 6;

— 7.1 except 7.1 a), 7.2.3 c), 7.4, 7.5, 7.6;

— 8.2.3, 8.2.4, 8.3, 8.5.2.

The FPC system may be part of an existing Quality Management system, (e.g. in accordance with EN ISO 9001: 2000), the scope of which covers the manufacture of the product.

Where a quality management system is certified in accordance with EN ISO 9001: 2000, by a certification body which is now a notified body, then the assessment reports of this quality management system should be taken into account with respect to these clauses.

ZA.2.2.3.3 Product specific requirements

The FPC system shall:

— address this European Standard; and

— ensure that the products placed on the market conform to the stated performance characteristics.

The FPC system shall include a product specific FPC or Quality-plan, which identifies procedures to demonstrate conformity of the product at appropriate stages, i.e.

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down; and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of conformity of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a). In any case the operation shall lead to an equivalent level of conformity of the product as if normal FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) centre as much on the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years. These records shall be available for inspection.

Where the product fails to satisfy the acceptance measures, the provisions for non-conforming products shall apply, the necessary corrective action shall immediately be taken and the products or batches not conforming shall be isolated and properly identified. Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test. With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

Individual products or batches of products and the related manufacturing documentation shall be completely identifiable and retraceable.

ZA.2.2.3.4 Initial inspection of factory and FPC

Initial inspection of FPC shall be carried out when the production process has been finalised and preferably in operation. The factory and FPC documentation shall be assessed to verify that the requirements of ZA.2.2.3.1 and ZA.2.2.3.2 are fulfilled.

In the assessment it shall be verified:

a) that all resources necessary for the achievement of the product characteristics required by this European Standard are or will be available; and

b) that the FPC-procedures in accordance with the FPC-documentation are or will be implemented and followed in practice; and

c) that the product complies or will comply with the initial type testing samples, for which compliance with this European Standard has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place.

If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

Provided that the production process is similar, assessments previously performed in accordance with the provisions of this standard may be taken into account providing that they were made to the same system of attestation of conformity on the same product or products of similar design, construction and functionality, such that the results may be considered applicable to the product in question.

NOTE Same system of attestation of conformity means inspection of FPC by an independent third party under the responsibility of a product certification body which is now a notified product certification body.

All assessments and its results shall be documented in a report.

ZA.2.2.3.5 Periodic surveillance of FPC

Surveillance of the FPC shall be undertaken once a year.

The surveillance of the FPC shall include a review of the quality plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance and the significance of any changes shall be assessed.

Checks shall be made to ensure that the quality plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to type testing and that the correct actions have been taken for non-compliant devices.

The surveillance of the FPC may be carried out as part of a surveillance or reassessment of a Quality Management System (e.g. in accordance with EN ISO 9001: 2000).

ZA.2.2.4 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics required by this standard, then all characteristics covered by the clauses shown in Table ZA.1, which may be changed by the modification, shall be subject to type testing or engineering evaluation, except as described in ZA.2.2.2.3 and ZA.2.2.2.4. Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

Any assessment and its results shall be documented in a report.

ZA.3 CE Marking and labelling and accompanying documentation

The manufacturer, or his authorised representative established within the EEA, is responsible for the affixing of the CE marking. The CE-marking symbol (in accordance with Directive 93/68/EEC) shall be placed on the product and be accompanied by the number of the EC certificate of conformity and the Notified Product Certification Body number. If the Notified Body number is included as part of the number of the EC certificate of conformity, then the number of the EC certificate of conformity is sufficient.

The CE marking symbol shall in addition be shown on the accompanying commercial documentation supplemented by:

a) the identification number of the Notified Product Certification Body;

b) the name or identifying mark and registered address of the manufacturer;

c) the last two digits of the year in which the marking was affixed;

d) the number of the EC certificate of conformity;

e) the reference to this European Standard (EN 14604);

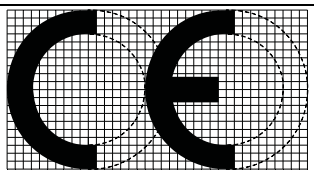
f) the description of the construction product (i.e. smoke alarm devices);

g) the type/model designation of the product;

h) the other information required by 4.19.3 or a reference to a document, which shall be uniquely identifiable and available from the manufacturer, containing this information.

Where the product exceeds the minimum performance levels stated in this standard, and where the manufacturer so desires, the CE marking may be accompanied by an indication of the parameter(s) concerned and the actual test result(s).

Figure ZA.1 gives an example of the CE marking information.



0123

AnyCo Ltd, P.O. Box 21, B1050

05

0123 - CPD – 002

EN 14604

Smoke alarm devices

ABC 123

Technical data: see Doc.123/2005 held by the manufacturer.

Figure ZA.1 — Example of CE marking information in the accompanying commercial documentation

ZA.4 EC certificate and declaration of conformity

The manufacturer, or his authorised representative established in the EEA, shall prepare and retain a declaration of conformity, which authorises the affixing of the CE marking. This declaration shall include:

— the name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— the description of the construction product (i.e. smoke alarm devices) and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— the type/model designation of the product;

— the provisions to which the product conforms (i.e. Annex ZA of this EN);

— any particular conditions applicable to the use of the product (if necessary);

— the name and address (or identification number) of the Notified Product Certification Body;

— the name of and position held by the person empowered to sign the declaration on behalf of the manufacturer or of his authorized representative.

The declaration shall contain a certificate of conformity with the following information:

— the name and address of the Notified Product Certification Body;

— the certificate number;

— the name and address of the manufacturer, or his authorised representative established in the EEA;

— the description of the construction product (i.e. smoke alarms);

— the type/model designation of the product;

— the provisions to which the product conforms (i.e. Annex ZA of this EN);

— any particular conditions applicable to the use of the product (if necessary);

— any conditions of validity of the certificate, where applicable;

— the name of and position held by the person empowered to sign the certificate.

The above-mentioned declaration and certificate shall be presented (if requested) in the language or languages accepted in the Member State in which the product is to be used.

Bibliography

[1] OECD, Recommendations for ionization chamber smoke alarms in implementation of radiation protection standards. Nuclear Energy Agency, Organization for Economic Co-operation and Development, Paris, France. 1977.

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