
Sistemi za odkrivanje in javljanje požara ter alarmiranje - 23. del: Naprave za alarmiranje - Vizualne alarmne naprave

Fire detection and fire alarm systems - Part 23: Fire alarm devices - Visual alarm devices

Brandmeldeanlagen - Teil 23: Feueralarmeinrichtungen - Optische Signalgeber

Systemes d'alarme feu et de détection d'incendie - Partie 23: Dispositifs d'alarme feu - Alarmes visuelles

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Ta slovenski standard je istoveten z: EN 54-23:2010
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ICS:

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

SIST EN 54-23:2010**en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 54-23

March 2010

ICS 13.220.20

English Version

**Fire detection and fire alarm systems - Part 23: Fire alarm
devices - Visual alarm devices**

Systèmes d'alarme feu et de détection d'incendie - Partie
23: Dispositifs d'alarme feu - Alarmes visuelles

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Optische Signalgeber

This European Standard was approved by CEN on 23 January 2010.

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Foreword

This document (EN 54-23:2010) has been prepared by Technical Committee CEN/TC 72 “Fire detection and fire alarm systems”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2010, and conflicting national standards shall be withdrawn at the latest by March 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

EN 54, *Fire detection and fire alarm systems*, consists of the following parts:

- *Part 1: Introduction*
- *Part 2: Control and indicating equipment*
- *Part 3: Fire alarm devices — Sounders*
- *Part 4: Power supply equipment*
- *Part 5: Heat detectors — Point detectors*
- *Part 7: Smoke detectors — Point detectors using scattered light, transmitted light or ionization*
- *Part 10: Flame detectors — Point detectors*
- *Part 11: Manual call points*
- *Part 12: Smoke detectors — Line detectors using an optical light beam*
- *Part 13: Compatibility assessment of system components*
- *Part 14: Guidelines for planning, design, installation, commissioning, use and maintenance (in preparation)*
- *Part 16: Voice alarm control and indicating equipment*
- *Part 17: Short-circuit isolators*
- *Part 18: Input/output devices*
- *Part 20: Aspirating smoke detectors*
- *Part 21: Alarm transmission and fault warning routing equipment*
- *Part 22: Resettable line-type heat detectors (in preparation)*

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- *Part 23: Fire alarm devices — VADs*
- *Part 24: Components of voice alarm systems — Loudspeakers*
- *Part 25: Components using radio links*
- *Part 26: Point fire detectors — Carbon monoxide fire detectors (in preparation)*
- *Part 27: Duct smoke detectors (in preparation)*
- *Part 28: Non-resettable (digital) line-type heat detectors (in preparation)*
- *Part 29: Multi-sensor fire detectors — Point detectors using a combination of smoke and heat sensors (in preparation)*
- *Part 30: Multi-sensor fire detectors — Point detectors using a combination of carbon monoxide and heat sensors (in preparation)*

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

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Introduction

The purpose of a visual fire alarm device (VAD) is to warn person(s) within, or in the vicinity of, a building of the occurrence of a fire emergency in order to enable such person(s) to take appropriate measures.

This European Standard allows manufacturers to specify VADs in terms of the range at which the required illumination is met. Three categories of device are defined, one for ceiling mounted devices, one for wall mounted devices and an open category. The maximum range of the VAD is tested by measuring the light output in a hemisphere surrounding it to determine its light distribution. As the light output of some VADs can change over time due, for example, to the effect of self-heating, a test has been introduced to check that the variation of light output over time is within an acceptable limit.

This European Standard gives common requirements for the construction and robustness of VADs as well as for their performance under climatic, mechanical and electrical interference conditions which are likely to occur in the service environment. VADs are classified in one of two application environment types, i.e. Type A and Type B. More severe climatic conditions are applied to devices that are primarily intended for outdoor applications (Type B) than those primarily intended for indoor applications (Type A).

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1 Scope

This European Standard specifies the requirements, test methods and performance criteria for visual alarm devices in a fixed installation intended to signal a visual warning of a fire between the fire detection and fire alarm system and the occupants of a building (see item C of Figure 1 of EN 54-1:1996). It is intended to cover only those devices which derive their operating power by means of a physical electrical connection to an external source such as a fire alarm system.

This European Standard specifies the evaluation of conformity and the marking of the visual alarm devices.

This European Standard applies to visual alarm devices that rely on software for their operation and to those that do not.

This European Standard applies only to pulsing or flashing visual alarm devices, for example xenon beacons or rotating beacons. Devices giving continuous light output are excluded from this European Standard.

This European Standard is not intended to cover visual indicators, for example those on detectors or on the control and indicating equipment.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 54-1:1996, *Fire detection and fire alarm systems — Part 1: Introduction*

EN 50130-4:1995, *Alarm systems — Part 4: Electromagnetic compatibility — Product family standard: Immunity requirements for components of fire, intruder and social alarm systems* (including EN 50130-4:1995/A1:1998 and EN 50130-4:1995/A2:2003)

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

EN 60068-2-1:2007, *Environmental testing — Part 2-1: Tests — Tests A: Cold* (IEC 60068-2-1:2007)

EN 60068-2-2:2007, *Environmental testing — Part 2-2: Tests — Test B: Dry heat* (IEC 60068-2-2:2007)

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

EN 60068-2-27:2009, *Environmental testing — Part 2-27: Tests — Test Ea and guidance: Shock* (IEC 60068-2-27:2008)

EN 60068-2-30:2005, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)* (IEC 60068-2-30:2005)

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

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

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

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)* (including EN 60529:1991/A1:2000)

EN 60695-11-10:1999, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods (IEC 60695-11-10:1999)* (including EN 60695-11-10:1999/A1:2003)

EN 60695-11-20:1999, *Fire hazard testing — Part 11-20: Test flames — 500 W flame test methods (IEC 60695-11-20:1999)* (including EN 60695-11-20:1999/A1:2003)

EN ISO 9001:2008, *Quality management systems — Requirements (ISO 9001:2008)*

ISO 23539:2005, *Photometry — The CIE system of physical photometry*

3 Terms, definitions and abbreviations

3.1 Definitions

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

3.1.1

coverage volume

volume within which the required illumination is achieved

3.1.2

normal axis

axis normal to the mounting plane which passes through the reference point

3.1.3

effective luminous intensity

measurement corresponding to the light output of the visual alarm device measured using the equipment and method detailed in Annex A

3.1.4

light output level

measurement corresponding to the light output of the visual alarm device measured using the equipment and method detailed in Annex B

3.1.5

mode (of operation)

one of a possible number of pre-defined light outputs of the visual alarm device which can be selected by means specified by the manufacturer

3.1.6

reference point

point representing the optical centre within or on the surface of the visual alarm device specified by the manufacturer

3.1.7

required illumination

illumination of 0,4 lm/m² on a surface perpendicular to the direction of the light emitted from the device

3.1.8

Type A visual alarm device

device primarily intended for indoor applications

NOTE Type A visual alarm devices may be suitable for some protected outdoor situations.

EN 54-23:2010 (E)**3.1.9****Type B visual alarm device**

device primarily intended for outdoor applications

NOTE Type B visual alarm devices may be more suitable than Type A visual alarm devices for some indoor situations where high temperature and/or humidity are present.

3.1.10**visual alarm device****VAD**

device which generates a flashing light to signal to the occupants of a building that a fire condition exists

3.2 Abbreviations

AC	Alternating current
DC	Direct current
EMC	Electromagnetic compatibility
RMS	Root mean square
VAD	Visual alarm device

4 Requirements

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4.1 General

In order to comply with this standard, VADs shall meet the requirements of Clause 4, 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.

4.2 Operational reliability**4.2.1 Duration of operation**

The VAD shall be rated for at least 100 h operation. No limitation on duty factor or maximum on-time shall prevent the device from operating the 1 h 'on' 1 h 'off' cycle required by the test procedure described in 5.2.

NOTE This requirement does not apply to the capacity of batteries which may be used within VADs as a means of local storage of operating power. The capacity and charging requirements of such batteries should meet the requirement of the system.

4.2.2 Provision for external conductors

The VAD shall provide space within its enclosure for external conductors to be brought in and terminated. Entry holes for conductors or cables shall be provided or the location where such holes are to be made shall be indicated by providing a template or some other suitable means.

Terminals for connecting external conductors shall be designed so that the conductors are clamped between metal surfaces without being damaged. Each terminal shall be capable of allowing the connection of any conductor having a cross-sectional area between 0,28 mm² and 1,5 mm² inclusive.

4.2.3 Flammability of materials

The VAD shall be constructed of material(s) capable of withstanding the tests specified in Clause 5. In addition, the material(s) of plastic enclosures shall meet the following flammability requirements:

- a) EN 60695-11-10:1999 as amended by EN 60695-11-10:1999/A1:2003 Class V-2 or HB75 for devices operating from a voltage source less than or equal to 30 V RMS or 42,4 V DC and consuming less than 15 W of power;
- b) EN 60695-11-20:1999 as amended by EN 60695-11-20:1999/A1:2003 Class 5VB for devices operating from a voltage source greater than 30 V RMS or 42,4 V DC and consuming more than 15 W of power.

NOTE Annex D gives information on the test requirements and classification given in the IEC standards and equivalent flammability ratings in UL 94.

4.2.4 Enclosure protection

The degree of protection provided by the enclosure of VADs shall meet the following requirements:

- a) for Type A VAD: Code IP21C of EN 60529:1991;
- b) for Type B VAD: Code IP33C of EN 60529:1991.

4.2.5 Access

Means shall be provided to limit access for removal of parts of the whole device, e.g. special tool, codes, hidden screws, seals, etc.

4.2.6 Manufacturer's adjustments

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

4.2.7 On site adjustments of behaviour

If there is provision for on-site adjustment of the behaviour of the VAD:

- a) for each setting at which compliance with this standard is claimed, the VAD shall comply with the requirements of this standard and access to the adjustment means shall only be possible by the use of a code or special tool or by removing the VAD from its base or mounting; and
- b) any setting(s) at which compliance with this European Standard is not claimed, shall only be accessible by the use of a code or special tool and it shall be clearly marked on the VAD or in the associated data that when these setting(s) are used, the VAD does not comply with the standard.

NOTE These adjustments may be carried out, for example, at the VAD or at the control and indicating equipment.

4.2.8 Requirements for software controlled devices

4.2.8.1 General

For VADs which rely on software control in order to fulfil the requirements of this European Standard, the requirements of 4.2.8.2, 4.2.8.3 and 4.2.8.4 shall be met.

EN 54-23:2010 (E)**4.2.8.2 Software documentation**

4.2.8.2.1 Documentation which gives an overview of the software design shall be submitted. This documentation shall be in sufficient detail for the design to be inspected for compliance with this European Standard 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 VAD;
 - 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.

4.2.8.2.2 Detailed design documentation, which only needs to be provided if required for assessment purposes, 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).

4.2.8.3 Software design

In order to ensure the reliability of the VAD, the following requirements for the 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 error in the program operation;
- c) the software shall be designed to avoid the occurrence of deadlock of the program flow.

4.2.8.4 Storage of program and data

The program necessary to comply with this European Standard 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 some special tool or code and shall not be possible during normal operation of the VAD.

Site-specific data shall be held in memory which will retain data for at least two weeks without external power to the VAD, unless provision is made for the automatic renewal of such data, following loss of power, within 1 h of power being restored.

4.3 Performance parameters under fire conditions

4.3.1 Coverage volume

4.3.1.1 VADs shall meet the requirement for coverage volume of at least one of the following three categories:

- a) 'C', ceiling mounted devices;
- b) 'W', wall mounted devices;
- c) 'O', open class devices.

4.3.1.2 Category C devices shall be further specified as **C-x-y** (see 4.3.6.2, d), 1)), where:

- **x** is either 3, 6 or 9, representing the maximum height, in metres (m), at which the device may be mounted; and
- **y** is the diameter, in metres (m), of the coverage cylindrical volume when the device is mounted at the ceiling height.

EXAMPLE **C-3-12** corresponds to a ceiling mounted device giving a coverage cylindrical volume of 12 m diameter at 3 m height.

4.3.1.3 Category W devices shall be further specified as **W-x-y** (see 4.3.6.2, d), 2)), where:

- **x** is the maximum height of the devices on the wall, in metres (m), with a minimum value of 2,4 m; and
- **y** is the width of a square room, in metres (m), covered by the device.

EXAMPLE **W-2,4-6** corresponds to a wall mounted device giving a coverage cuboid volume of 2,4 m × 6 m × 6 m when mounted at a height of 2,4 m.

4.3.1.4 For category O devices the coverage volume in which the required illumination is achieved shall be specified (see 4.3.6.2, d), 3)).

4.3.2 Variation of light output

When tested in accordance with 5.3.2, the variation in effective luminous intensity of the VAD, over 30 min, shall be less than 25 %.

4.3.3 Minimum and maximum effective luminous intensity

When tested in accordance with 5.3.3, the VAD shall produce an effective luminous intensity of at least 1 cd for 70 % of all measurement points and shall not exceed 500 cd for any measurement points.

4.3.4 Light colour

The VAD shall emit a white or red flashing light.