



SLOVENSKI STANDARD

SIST EN 54-24:2008

01-julij-2008

Sistemi za odkrivanje in javljanje požara ter alarmiranje - 24. del: Sestavni deli zvočnih sistemov za javljanje požara - Zvočniki

Fire detection and fire alarm systems - Part 24: Components of voice alarm systems - Loudspeakers

Brandmeldeanlagen - Teil 24: Komponenten für Sprachalarmierungssysteme - Lautsprecher

Systemes de détection et d'alarme incendie - Composants des systemes d'alarme vocale - Partie 24 : Haut-parleurs

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13.320	Alarmni in opozorilni sistemi	Alarm and warning systems

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 54-24

April 2008

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English Version

**Fire detection and fire alarm systems - Part 24: Components of
voice alarm systems - Loudspeakers**

Systèmes de détection et d'alarme incendie - Composants
des systèmes d'alarme vocale - Partie 24 : Haut-parleurs

Brandmeldeanlagen - Teil 24: Komponenten für
Sprachalarmierungssysteme - Lautsprecher

This European Standard was approved by CEN on 23 February 2008.

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Foreword

This document (EN 54-24:2008) 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of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by April 2011.

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*
- *Part 15: Point detectors using a combination of detected phenomena*
- *Part 16: Voice alarm control and indicating equipment*
- *Part 17: Short-circuit isolators*
- *Part 18: Input/output devices*
- *Part 20: Aspirating smoke detectors*
- *Part 21: Alarm transmission and fault warning routine equipment*

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- *Part 22: Resettable line-type heat detectors*
- *Part 23: Fire alarm devices – Visual alarms*
- *Part 24: Components of voice alarm systems – Loudspeakers*
- *Part 25: Components using radio links*
- *Part 26: Point fire detectors using carbon monoxide sensors¹⁾*
- *Part 27: Duct smoke detectors¹⁾*

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, 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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1) Under preparation.

Introduction

The purpose of a voice alarm loudspeaker as a component of a voice alarm system is to provide intelligible warning to person(s) within, or in the vicinity of, a building in which a fire emergency has occurred and to enable such person(s) to take appropriate measures against a pre-determined evacuation plan.

The primary reason for using a voice alarm system instead of the coded warnings given by sounders is to reduce the time taken for those at risk to recognize that an emergency exists, and to give clear instructions on what to do next. This means that voice alarm loudspeakers need to achieve a minimum acoustical performance, as well as constructional and environmental requirements, to be suitable for use in fire detection and fire alarm systems.

This standard recognizes that the exact nature of the acoustical requirements for voice alarm loudspeakers will vary according to the nature of the space into which there are installed. It therefore specifies the minimum requirements that apply to voice alarm loudspeakers and a common method for testing their operational performance against parameters specified by the manufacturers.

This European Standard gives common requirements for the construction and robustness of voice alarm loudspeakers as well as their performance under climatic and mechanical conditions which are likely to occur in the service environment. As the types of loudspeaker considered in this European Standard are passive electromechanical devices not involving sensitive electronic circuits, electromagnetic compatibility (EMC) tests have not been included. The loudspeakers have been classified in either an indoor or an outdoor application environment category.

This European Standard requires that manufacturers specify certain characteristics in a consistent manner so that designers can make objective decisions about which loudspeaker to use in specific applications.

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1 Scope

This European Standard specifies requirements, test methods and performance criteria for loudspeakers intended to broadcast a warning of fire between a fire detection and fire alarm system and the occupants of a building.

This European Standard specifies loudspeakers for two types of application environment: type A, generally for indoor use and type B, generally for outdoor use.

This European Standard does not cover loudspeakers for special applications, for example loudspeaker for use in hazardous applications, if such applications require additional or other requirements or tests than those given in this European Standard.

This European Standard is not intended to cover addressable loudspeakers, loudspeakers with active components.

Voice alarm sounders are covered in EN 54-3:2001.

2 Normative references

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

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

EN 54-3:2001, *Fire detection and fire alarm systems — Part 3: Fire alarm devices — Sounders*

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 — Test A: Cold* (IEC 60068-2-1:2007)

EN 60068-2-2:1993, *Basic environmental testing procedures — Part 2-2: Tests — Tests B — Dry heat* (IEC 60068-2-2:1974 + IEC 60068-2-2 A:1976)

EN 60068-2-2:1993/A1:1993, *Basic environmental testing procedures — Part 2-2: Tests — Tests B — Dry heat — (IEC 60068-2-2:1974/A1:1993)*

EN 60068-2-2:1993/A2:1994, *Basic environmental testing procedures — Part 2-2: Tests — Tests B — Dry heat — (IEC 60068-2-2:1974/A2:1994)*

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

EN 60068-2-27:1993, *Basic environmental testing procedures — Part 2: Tests — Test Ea and guidance: Shock* (IEC 60068-2-27:1987)

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* (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)

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

EN 60529:1991/A1:2000, *Degrees of protection provided by enclosures (IP code) — Amendment A1 (IEC 60529:1989/A1:1999)*

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)*

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

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

EN 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters (IEC 61260:1995)*

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)*

IEC 60268-1:1985, *Sound system equipment — Part 1: General*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1

1/3 octave

frequency band as defined in EN 61260

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3.1.2

coverage angle

smallest angle between two directions on either side of the reference axis at which the sound pressure level is 6 dB less than the sound pressure level on the reference axis

NOTE This angle is measured in the vertical and horizontal planes.

3.1.3

free-field condition

acoustical environment in which the sound pressure decreases with the distance (r) from a point source according to a $1/r$ law, with an accuracy of $\pm 10\%$, in the region that will be occupied by the sound field between the loudspeaker system and the microphone during the measurements

EXAMPLE An anechoic room, a quiet outdoor space.

3.1.4

frequency response

sound pressure level at a distance of 4 m from the reference point on the reference axis, produced at 1/3 octave frequency bands, from 100 Hz to 10 kHz (centre frequencies)

NOTE This is also referred to as magnitude or amplitude response.

3.1.5**ground plane measurement**

measurement under half-space free-field conditions used to simulate a free-field condition in which the loudspeaker is mounted above an acoustically totally reflective boundary surface and aimed so that its reference axis is points towards a measurement microphone that is placed directly on the boundary surface

NOTE In order to achieve measurement results that are comparable with a free-field condition, ground-plane measurements need to be corrected by -6 dB at all frequencies.

3.1.6**half-space free-field condition**

acoustical environment that is confined by a plane of sufficient size and in which the free-field exists in a hemisphere, so that the sound pressure from a point source mounted in the surface of that plane decreases in the manner defined in 3.1.3

EXAMPLE A half-space anechoic room.

3.1.7**horizontal plane**

virtual plane of the loudspeaker containing the reference axis, as specified by the manufacturer

NOTE There may be several horizontal planes corresponding to several reference axes.

EXAMPLE See Annex C.

3.1.8**maximum sound pressure level**

total sound pressure level at 4 m from the reference point on the reference axis of a loudspeaker supplied with a simulated programme signal at the rated noise power

NOTE For simulated programme signal see 3.1.19.

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3.1.9**measuring distance**

distance between the reference point (see 3.1.17) and the measuring microphone

3.1.10**loudspeaker**

transducer which converts electrical energy into acoustical energy, comprising one or more drive units, one or more enclosures, a cable termination block, and relevant devices such as filters, transformers and any passive element

NOTE Some loudspeakers are a combination of one or more loudspeaker housing(s) and a termination box interconnected by a cable. The loudspeaker housing(s), cable(s) and terminal box should be considered to be 'the loudspeaker' for the purposes of this European Standard. Examples of such loudspeakers include: pendant types and loudspeakers with mechanically adjustable orientation such as horn or column loudspeakers and loudspeaker arrays.

3.1.11**pink noise**

random noise signal with a spectral density that decreases by 3 dB per octave, giving constant energy per octave

3.1.12**rated impedance**

value of pure resistance, stated by the manufacturer that is to be substituted for the loudspeaker when defining the required power of the source

EN 54-24:2008 (E)**3.1.13****rated noise power**

electrical power calculated from the equation U_n^2/R , where U_n is the rated noise voltage and R is the rated impedance

NOTE 1 For transformer-coupled loudspeakers, the rated noise power is the highest power setting specified by the manufacturer.

NOTE 2 The rated noise power is also called power-handling capacity.

3.1.14**rated noise voltage**

RMS voltage, as specified by the manufacturer, of the simulated programme signal that the loudspeaker can handle without thermal or mechanical damage

NOTE 1 See Annex B.

NOTE 2 For transformer-coupled loudspeakers, the rated noise voltage typically equals 50 V, 70 V or 100 V.

3.1.15**reference axis**

virtual axis of the loudspeaker as specified by the manufacturer

NOTE There can be several reference axis.

EXAMPLE See Annex C.

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3.1.16**reference plane**

virtual plane perpendicular to the reference axis, as specified by the manufacturer

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EXAMPLE See Annex C. <https://standards.iteh.ai/catalog/standards/sist/593db186-ca94-49d4-8604-a9cf62d0c4be/sist-en-54-24-2008>

3.1.17**reference point**

point at the intersection of the reference plane and the reference axis

EXAMPLE See Annex C.

3.1.18**sensitivity**

sound pressure level S of a loudspeaker supplied with a 1 W pink noise signal from 100 Hz up to 10 kHz measured at a distance of 4 m from the reference point on the reference axis

3.1.19**simulated programme signal**

signal, whose mean power spectral density closely resembles the average of the mean power spectral densities of a wide range of audio signals

EXAMPLE See Annex B.

3.1.20**type A loudspeaker**

loudspeaker that is primarily intended for indoor applications

NOTE Type A loudspeakers can be suitable for some protected outdoor situations.

3.1.21**type B loudspeaker**

loudspeaker that is primarily intended for outdoor applications

NOTE Type B loudspeakers can be more suitable than type A for some indoor situations where high temperature and/or humidity are present.

3.1.22

vertical plane

virtual plane of the loudspeaker perpendicular to the horizontal plane and containing the reference axis

EXAMPLE See Annex C.

3.2 Abbreviations

DC Direct current

RMS Root mean square

4 Requirements

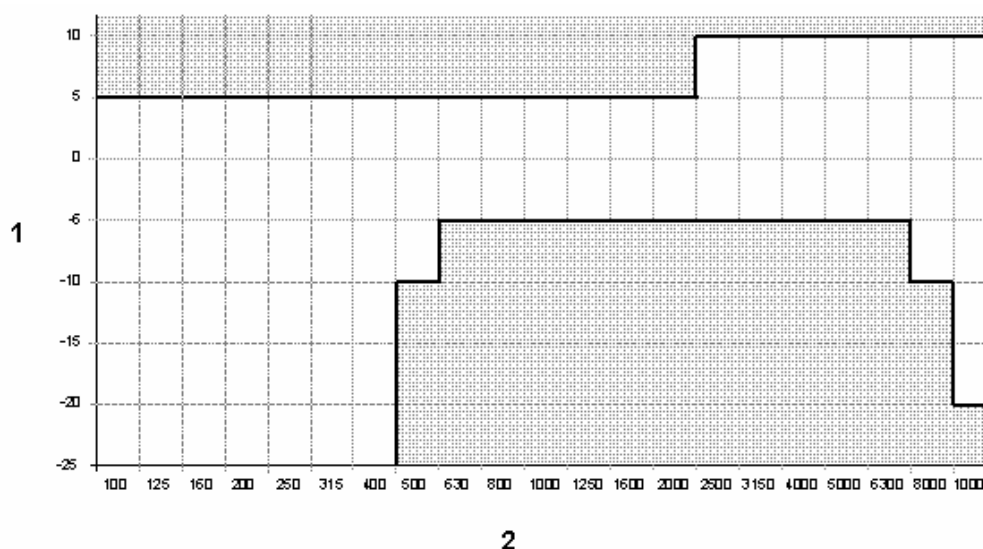
4.1 Compliance

In order to conform to this European Standard, voice alarm loudspeakers 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.

4.2 Frequency response limits

The loudspeaker frequency response shall fit within the un-shaded area shown in Figure 1.

NOTE If the frequency response shown in Figure 1 can only be achieved by means of a frequency equalizer that is specified by the manufacturer for normal use (see 4.5.2 b)), it is acceptable to insert a dedicated equalizer in the measurement setup (see 5.1.6).



Key

- 1 relative level [dB]
- 2 1/3 octave band centre frequency [Hz]

Figure 1 — Frequency response limit

EN 54-24:2008 (E)**4.3 Durability**

The voice alarm loudspeaker shall be rated for at least 100 h operation at the rated noise power specified by the manufacturer (refer to the test procedure described in 5.6).

4.4 Construction**4.4.1 Provision for external conductors**

The loudspeaker 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 they are clamped between metal surfaces without being damaged. Each terminal shall enable the connection of any conductor having a cross-sectional area between 0,8 mm² and 2,5 mm².

4.4.2 Materials

The loudspeaker shall be constructed of material(s) capable of withstanding the tests specified in Clause 5. In addition, the material(s) of plastic enclosures shall conform to 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.

4.4.3 Enclosure protection

The degree of protection provided by the enclosure of fire alarm loudspeakers shall conform to the following requirements:

- for type A, indoor applications: Code IP21C of EN 60529:1991 as amended by EN 60529:1991/A1:2000;
- for type B, outdoor applications: Code IP33C of EN 60529:1991 as amended by EN 60529:1991/A1:2000.

4.4.4 Access

Means shall be provided to limit access for removal of parts of or the whole device and to make adjustment to the mode of operation, e.g. special tool, codes, hidden screws, seals.

4.5 Marking and data**4.5.1 Marking**

Each voice alarm loudspeaker shall be clearly marked with the following information:

- a) number of this European Standard (i.e. EN 54-24);
- b) environmental type, i.e. type A or type B;
- c) name or trademark of the manufacturer or supplier;
- d) manufacturer or supplier model designation (type or number);

- e) terminal designations;
- f) rated noise voltage for transformer-coupled loudspeakers;
- g) rated impedance for direct-coupled loudspeakers;
- h) rated noise power (at the highest power setting);
- i) power settings (e.g. transformer tapping options for transformer-coupled loudspeakers);
- j) mark(s) or code(s) (for example, a serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture.

Where any marking on the device uses symbols or abbreviations not in common use then these shall be explained in the data supplied with the device.

The marking need not be discernible when the device is installed and ready for use but shall be visible during installation and shall be accessible during maintenance. The markings shall not be placed on screws or other easily removable parts.

4.5.2 Information in the product data sheet

The information required in 4.5.1 together with the following shall be supplied with the device, or shall be given in a data sheet or technical manual identified on, or with each device:

- a) frequency response for each stated reference axis;
- b) sensitivity for the stated reference axis (see 5.1.5);
- c) horizontal and vertical coverage angles at 500 Hz, 1 kHz, 2 kHz, 4 kHz for each stated reference plane, measured as described in 5.4.2;
- d) maximum sound pressure level (at highest power setting) for each stated reference plane, measured as described in 5.5.2;
- e) reference axis, reference plane and horizontal plane;
- f) rated noise power, measured as described in 5.6.2;
- g) rated impedance for each tapping, measured as described in 5.3.2;
- h) 1/3 octave band frequency response of any dedicated active equalization which may be required;
- i) any other information necessary to enable correct installation, operation and maintenance of the device;
- j) acoustical measurement environment used for the specifications listed in this data sheet, e.g. free-field, half-space free-field, standard baffle.

If different settings, except power settings, are available on the loudspeaker, such as tone control or adjustable parts, the manufacturer shall specify, for each of the above, the applicable configuration(s).