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Fire detection and fire alarm systems – Part 3: Fire alarm devices – Sounders

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Brand och räddning – Branddetekterings- och brandlarmsystem – Del 3: Akustiska larmdon

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Alarmierungseinrichtungen

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 72 "Fire detection and fire alarm systems", the secretariat of which is held by BSI.

EN 54 is published in a series of parts. Information on the relationship between this European Standards and other standards of the EN 54 series is given in Annex A of EN 54-1:1996.

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of an identical text or by endorsement, at the latest by October 2001, and conflicting national standards shall be withdrawn at the latest by October 2003. For products which have complied with the relevant national standard before the date of withdrawal (dow), as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until October 2006.

This standard has been prepared in co-operation with the CEA (Comité Européen des Assurances) and with EURALARM (Association of European Manufacturers of Fire and Intruder Alarm Systems).

This European Standard 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).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

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

This standard recognizes that the exact nature of the sound requirement, i.e. its frequency range, temporal pattern and output level will vary according to the nature of the installation, the type of risk present and appropriate measures to be taken, the type of signals used for other non-fire emergency alarms (see, for example, EN 457) and national differences in custom and practice. The resulting standard specifies, therefore, a common method for the testing of the operational performance of sounders against the specification declared by the manufacturer rather than imposing common requirements.

Attention is drawn to ISO 8201 : 1987, Acoustics - Audible emergency evacuation signal, the international standard which specifies the temporal pattern and the required sound pressure level of an audible emergency evacuation signal.

This standard gives common requirements for the construction and robustness of sounders as well as for their performance under climatic, mechanical and electrical interference conditions which are likely to occur in the service environment. The sounders have been classified in either an indoor or an outdoor application environment category.

1 Scope

This European Standard specifies the requirements, test methods and performance criteria for fire alarm sounders in a fixed installation intended to signal an audible warning of fire between a fire detection and fire alarm system and the occupants of a building. 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 standard specifies fire alarm sounders for two types of application environment, type A for indoor use and type B for outdoor use.

This standard is not intended to cover:

- a) loudspeaker type devices primarily intended for emitting emergency voice messages;
- b) supervisory sounders, for example, within the control and indicating equipment.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<u>Publication</u>	<u>Title</u>
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
EN 60068-1:1994	Environmental testing – Part 1: General and guidance (IEC 60068-1:1988 + Corrigendum 1988 + A1:1992)
EN 60068-2-1:1993	Environmental testing – Part 2: Tests, tests A: cold (IEC 60068-2-1:1990)
EN 60068-2-2:1993	Basic environmental testing procedures – Part 2: Tests, tests B: dry heat (IEC 60068-2-2:1974 + IEC 68-2-2 A:1976)
HD 323.2.3 S2:1987	Basic environmental testing procedures – Part 2: Tests, tests Ca: damp heat, steady state
EN 60068-2-6:1995	Environmental testing – Part 2: Tests – Tests 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)
IEC 60068-2-30:1980	Basic environmental testing procedures – Part 2: Tests – Tests Db and guidance: Damp heat, cyclic (12 + 12 – hour cycle)
IEC 60068-2-42:1982	Basic environmental testing procedures – Part 2: Tests – Test Kc: Sulphur dioxide test for contacts and connections
HD 323.2.56 S1:1990	Basic environmental testing procedures – Part 2: Tests, test Cb: damp heat, steady state, primarily for equipment
IEC 68-2-63:1997	Environmental testing – Part 2: Test methods – Test Eg: Impact, spring hammer
EN 60529:1991	Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)
IEC 60651:1979	Sound level meters
ISO 1210:1992	Plastics – Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source
ISO 10351:1992	Plastics – Determination of the combustibility of specimens using a 125 mm flame source

3 Terms and definitions

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

3.1 mode (of operation): One of a possible number of pre-defined sound outputs of the audible alarm device which can be selected by means specified by the manufacturer.

3.2 A-weighted sound level: Sound pressure, expressed in dB, which is 20 times the logarithm to base ten of the ratio of the A-weighted sound pressure to the reference pressure of 20 mPa (20 mN/m²) - A-weighting characteristics are given in IEC 60651:1979.

3.3 type A device: Audible fire alarm device - sounder, designed for indoor application.

3.4 type B device: Audible fire alarm device - sounder, designed for outdoor application.

3.5 supervisory sounder: Audible device, usually mounted within a piece of equipment (e.g. control and indicating equipment), used for drawing attention, locally, to a change in status or the presence of an abnormal condition indicated by that equipment.

3.6 fire alarm sounder: Sound generating device intended to signal an audible warning of fire between a fire detection and fire alarm system and the occupants of a building, without the use of a voice signal.

4 Requirements

4.1 Compliance

In order to comply with this standard, fire alarm sounders 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 Sound level

The standard requires that the manufacturer declare sound levels in the data required under 4.6.2. The manufacturer may declare different sound levels for operation under different conditions, for example, when operating on different voltage ranges or with different sound patterns. If this is the case the sound level of each specimen shall be measured under each mode of operation (see 5.3).

When tested in accordance with 5.3. the fire alarm sounder shall produce A-weighted sound levels of at least 65 dB in one direction and not exceeding 120 dB in any direction.

4.3 Frequency and sound pattern

This standard covers sounders which produce different frequencies and sound patterns and, therefore, does not specify a minimum and maximum frequency or a specific sound pattern.

NOTE The sound patterns and frequencies required may vary in different countries. Reference needs to be made to local regulations.

However, the manufacturer shall declare the main sound frequency(ies), frequency range(s) and sound pattern(s) in the data required under 4.6.2.

4.4 Durability

The sounder shall be rated for at least 100 hours operation. No limitation by the manufacturer 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 5.4.

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

4.5 Construction

4.5.1 Provision for external conductors

4.5.1.1 The sounder 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.

4.5.1.2 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.

4.5.2 Materials

The sounder shall be constructed of material(s) capable of withstanding the tests described in 5.2 to 5.17. In addition, the material(s) of plastic enclosures shall meet the following flammability requirements:

- a) ISO 1210 : 1992 Class FV-2 or FH-2 for devices operating from a voltage source less than 30 V r.m.s. or 42,4 V d.c. and consuming less than 15 W of power.
- b) ISO 10351 : 1992 Class LFV-1 for devices operating from a voltage source greater than 30 V r.m.s. or 42,4 V d.c. and/or consuming more than 15 W of power.

4.5.3 IP ratings

The degree of protection provided by the enclosure of fire alarm sounders shall meet the following requirements:

- a) for Type A audible alarm device - Sounder : Code IP21C of EN 60529:1991;
- b) for Type B audible alarm device - Sounder : Code IP33C of EN 60529:1991.

4.5.4 Access

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

4.6 Marking and data

4.6.1 Marking

Each fire alarm sounder shall be clearly marked with the following information:

- a) number of this standard (i.e. EN 54-3);
- b) environment type (i.e. Type A or B (see clause 3));
- c) name or trademark of the manufacturer or supplier;
- d) manufacturer or supplier model designation (type or number);
- e) terminal designations;
- f) rated supply voltages or voltage ranges (a.c. or d.c.);
- g) power and current consumption;
- h) a mark(s) or code(s) (for example, serial number or batch code), by which the manufacturer can identify, at least, the date or batch and place of manufacture, and the version number(s) of any software contained within the device.

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.

4.6.2 Data

The information required in 4.6.1 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) operating voltage range(s);
- b) supply frequency ranges, where relevant;
- c) for all modes of operation, the minimum A-weighted sound level in dB at a distance of 1 m from the reference point of the device for the following directions of radiation:
 - 1) surface mounted device: at 30° intervals from 15° to 165° through a semi-circular arc in front of the device and centered at the intersection of its normal mounting surface and its principal axis, for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Annex A, figure A2);
 - 2) pole mounted device: at 30° intervals through a 360° circle centered at the intersection of the horizontal plane containing its principal axis and the vertical line through the geometrical centre of the sound diffusing assembly, for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Annex A, figure A3).
- d) main sound frequency(ies), frequency range(s) and sound pattern(s);
- e) IP Code to EN 60529:1991;
- f) any other information necessary to allow correct installation, operation and maintenance of the device.

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 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.

The temperature and humidity shall be substantially constant for each test where these standard atmospheric conditions are applied.

5.1.2 Operating conditions for tests

If a test method requires a specimen to be sounding, then the specimen shall be connected to suitable power supply equipment as specified in the data provided by the manufacturer. Where, in order to be sounding, a device also requires the application of a control signal or signals, this shall be provided in accordance with the manufacturer's specification.

If a test method requires a specimen to be in the quiescent state, then the specimen shall not be supplied with power unless it is a sounder of the types which have electronic circuits for analyzing control signals and triggering the sound operation, in which case the specimen shall be connected to suitable power supply and control equipment as specified in the data provided by the manufacturer and the control signals shall be arranged so that the specimen is in a non-sounding state.

Unless otherwise specified in the test procedure, the supply parameters applied to the specimen shall be set within the manufacturer's specified range(s) and shall remain constant throughout the tests. The value chosen for each parameter shall be the nominal value, or the mean of the specified range.

If the manufacturer has declared different sound levels for operation under different conditions (see 4.6.2), then, unless otherwise specified by the test procedure, the tests shall be conducted under one selected mode of operation only. Selection of the mode of operation shall be made with the aim to use that which consumes the most power. This will normally be the most continuous or the loudest mode.

NOTE All modes of operation and all voltage ranges are tested in 5.3.

5.1.3 Mounting arrangements

Unless otherwise specified, the specimen shall be mounted by its normal means of attachment in accordance with the manufacturer's instructions on a flat rigid backing board. If these instructions describe more than one method of mounting then the method considered to be most unfavourable shall be chosen for each test.

The detailed mounting arrangements are given in Annex A or Annex B for the different sound level tests used.

5.1.4 Tolerances

The tolerances for the environmental test parameters shall be given in the basic reference standards for the test (e.g. the relevant part of EN 60068).

If a specific tolerance or deviation limit is not specified in a requirement or test procedure, then a deviation limit of $\pm 5\%$ shall be applied.

5.1.5 Provision for tests

The following shall be provided for testing compliance with this European Standard:

- a) eight specimens of type A or ten specimens of type B sounder with any mounting, bases, boxes or accessories etc.;
- b) any equipment, such as control and indicating equipment, as may be necessary for the correct operation of the device in accordance with the manufacturer's specification;
- c) The data required in 4.6.2.

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

NOTE: The details of the power supply equipment used and/or the equipment used for generating the control signal(s) should be given in the test report.

5.1.6 Test schedule

The specimens shall be tested and inspected according to the schedule given in table 1.

All the specimen shall be first submitted to the reproducibility test described in 5.2. On completion of the reproducibility test, the specimen with the least loud sound level shall be numbered 1 and the rest arbitrarily numbered from 2 to 8 for Type A or 2 to 10 for Type B.

Unless otherwise required by the test procedure, the mode of operation selected for conducting the reproducibility test shall be used for the other tests.

5.2 Reproducibility

5.2.1 Object of the test

To show that the sound output of the sounder does not vary unduly from specimen to specimen and to establish sound output data for comparison with the sound output measured during and/or after the environmental tests specified in this standard.

5.2.2 Test procedure

The A-weighted sound levels of all the specimens shall be measured as described in Annex B.

The measurement shall be recorded in dB for each specimen and the sound level of the loudest and the least loud specimen shall be represented by L_{\max} and L_{\min} respectively.

5.2.3 Test requirements

The audible alarm device shall be deemed to comply with the requirements of this subclause if the difference between L_{\max} and L_{\min} is less than 6 dB.

5.3 Operational performance

5.3.1 Object of the test

To check that the sound levels declared by the manufacturer can be achieved within the specified range(s) of supply parameters (e.g. voltage) and is not unduly dependent on these parameters, and that the maximum A-weighted sound level does not exceed 120 dB at 1 m.

5.3.2 Test procedure

The sound level of the specimen shall be measured in free field conditions using the test method described in Annex A with the supply parameters at the maximum and minimum of the specified range(s) (see 4.6.2 a) and b)).

If the manufacturer has declared different sound levels and different operating frequencies for different modes of operation (see 4.6.2 d)), then the sound level of the specimen shall be measured under each mode.

5.3.3 Test requirements

The sounder shall be deemed to comply with the requirements of this subclause if, for each mode of operation,:

- a) the A-weighted sound level is greater than 65 dB in at least one direction;
- b) the A-weighted sound level does not exceed 120 dB in any direction;
- c) the sound level measured at each of the specified angles is not less than that declared by the manufacturer (see 4.6.2 c))
- d) the difference between the A-weighted sound levels measured at the maximum and minimum supply parameters is not more than 6 dB, for each direction measured.