BS EN 54-3:2014

BSI Standards Publication

Fire detection and fire alarm systems

Part 3: Fire alarm devices — Sounders

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National foreword

This British Standard is the UK implementation of EN 54-3:2014. It supersedes BS EN 54-3:2001 which is withdrawn.

The UK committee would like to draw attention to the following two interpretation issues that were raised during the UAP ballot but not included in the ratified text.

- Table 2 footnote c, as it reads, suggests that no conducted tests are required on battery powered radio controlled sounders, even if they have wires. It is the opinion of the UK committee that this interpretation would be incorrect. The UK committee modification submitted at the UAP ballot is reproduced below:

"These conducted EMC tests are not required for sounders that operate by radio-link only and that derive their power from internal batteries only".

- The UK committee are also of the opinion that the marking requirement in Clause 8 should not have been changed from the previous edition. The marking requirement from EN 54-3:2001 (see 4.6.1) which is reproduced below for information:

"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 UK participation in its preparation was entrusted by Technical Committee FSH/12, Fire detection and alarm systems, to Subcommittee FSH/12/5, Alarm devices, voice alarm evacuation sub-systems and emergency voice communications.

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.

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

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

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Brandmeldeanlagen - Teil 3: Feueralarmeinrichtungen Akustische Signalgeber

This European Standard was approved by CEN on 8 May 2014.

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

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Foreword

This document (EN 54-3:2014) 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 January 2015, and conflicting national standards shall be withdrawn at the latest by April 2016.

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 supersedes EN 54-3:2001.

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 54-3 has been revised so as to align with the second answer of CEN/TC 72 to Mandate M/109. EN 54-3 includes new clauses and annexes as follows:

— Requirements for software controlled devices (5.2.8);

— Clause 6 Assessment and verification of constancy of performance (AVCP);

— Clause 7 Classification and designation;

— Clause 8 Marking, labelling and packaging;

— Annex C Data supplied with sounders;

— Annex D (informative) Sound patterns used in some European countries;

— Annex E (informative) Comparison of flammability test requirements in various standards.

The previous Annex C dealt with the requirements and test methods for voice sounders. The content of this annex has been integrated in the main body of the standard, specifically under 4.3.3, 4.3.4, 4.3.5, 5.3.3. 5.3.4 and 5.3.5. In addition, Annex ZA has been revised to align with the Construction Products Regulation (CPR).

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 detector – Point detectors*

— *Part 11: Manual call points*

— *Part 12: Smoke detectors – Line detector 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*

— *Part 22: 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 and system requirements*

— *Part 26: Carbon monoxide detectors – Point detectors*

— *Part 27: Duct smoke detectors*

— *Part 28: Non-resettable (digital) line type heat detectors*

— *Part 29: Multi-sensor fire detectors - Point detectors using a combination of smoke and heat sensors*

— *Part 30: Multi-sensor fire detectors - Point detectors using a combination of carbon monoxide and heat sensors*

— *Part 31: Multi-sensor detector – Point detectors using a combination of smoke, carbon monoxide and optionally heat sensors*

— *Part 32: Guidelines for the planning, design, installation, commissioning, use and maintenance of voice alarm systems*

NOTE This list includes standards that are in preparation and other standards may be added. For current status of published standards refer to www.cen.eu.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey 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 a person(s) to take appropriate measures.

This European Standard recognizes that the exact nature of the sound requirements, 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 by other non-emergency alarms (see, for example, EN ISO 7731) 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.

In some European countries, specific frequencies of sound and sound patterns are used. These may be given in national codes or standards (see Annex D). Attention is drawn to national safety regulations which may specify maximum safe sound pressure level received by occupants of a building.

Attention is also 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 European Standard gives common requirements for sounders as well as for their performance under climatic, mechanical and electrical interference conditions which are likely to occur in the service environment. This European Standard covers sounders for either an indoor or an outdoor application environment category.

In fire detection and fire alarm systems, voice sounders are used as alarm devices for warning the occupants of a building of the occurrence of a fire risk, using a combination of an attention-drawing signal and dedicated voice message(s). The requirements, test methods and performance criteria specified in this standard for sounders are also applicable to voice sounders. Additional requirements, test methods and performance criteria specific to voice sounders are also incorporated.

1 Scope

This European Standard specifies the requirements, test methods and performance criteria for fire alarm sounders, including voice sounders, in a fixed installation intended to signal an audible warning between the fire detection and fire alarm systems and the occupants of a building (see EN 54-1:2011).

This European Standard provides for the assessment and verification of constancy of performance (AVCP) of fire alarm sounders to this EN.

This European Standard is not intended to cover:

a) loudspeaker type devices primarily intended for emitting emergency voice messages that are generated from an external audio source;

b) supervisory sounders, for example, within the control and indicating equipment.

2 Normative references

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

EN 54-1:2011, *Fire detection and fire alarm systems - Part 1: Introduction*

EN 50130-4:2011, *Alarm systems - Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder, hold up, CCTV, access control and social alarm systems*

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

EN 60068-2-1:2007, *Environmental testing - Part 2-1: Tests - Test 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 - Test 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 60068-2-78:2013, *Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state (IEC 60068-2-78:2012)*

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) (IEC 60529:1989/A1:1999)*

EN 60695-11-10:2013, *Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods (IEC 60695-11-10:2013)*

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 (IEC 60695-11- 20:1999/A1:2003)*

EN 61672-1:2003, *Electroacoustics - Sound level meters - Part 1: Specifications (IEC 61672-1:2002)*

3 Terms, definitions and abbreviations

For the purposes of this European Standard, the following terms, definitions and abbreviations and those given in EN 54-1 apply.

3.1 Definitions

3.1.1
A-weighted sound pressure level
L_{pA}
sound pressure level, expressed in dB(A), which is 20 times the logarithm to base ten of the ratio of the A-weighted sound pressure level to the reference pressure of 20 µPa at 1 kHz

Note 1 to entry: The A-weighting characteristics are given in EN 61672–1:2003.

3.1.2
delta sound pressure level
$\Delta(L_{pA})$
decrease in the mean A-weighted sound pressure level between measurements on the same specimen (Annex B)

Note 1 to entry: In this standard $\Delta(L_{pA})$ is used to compare the sound pressure level measured during environmental tests with that first measured on the same specimen during the reproducibility test.

3.1.3
equivalent sound pressure level
$L_{Aeq,T}$
the value of the sound pressure level, in dB(A), of continuous sound that, within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time

3.1.4
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

3.1.5
maximum sound pressure level
$L_{AFmax,T}$
the maximum value of the sound pressure level, in dB(A), measured within a specified time interval, T and with a specified time weighting

Note 1 to entry: For application within the framework of this standard the time weighting Fast applies. Refer to EN 61672–1:2003.

3.1.6
mode (of operation)
one of a possible number of pre-defined sounds (or sound outputs) of the sounder which can be selected by means specified by the manufacturer

EXAMPLE Sound patterns, sound pressure levels.

3.1.7
reference point
point representing the origin of the sound within or on the surface of the sounder as specified by the manufacturer

Note 1 to entry: The reference point is used in Annex A.

3.1.8
sound pattern
pre-defined acoustic alarm signal

Note 1 to entry: Sound pattern is also often referred to as tone.

3.1.9
supervisory sounder
audible device on a piece of equipment used for drawing attention to a change of status

Note 1 to entry: Supervisory sounders are often mounted within the fire detection and fire alarm control and indicating equipment.

3.1.10
type A sounder
device primarily intended for indoor applications

Note 1 to entry: Type A sounders may be suitable for some protected outdoor situations.

3.1.11
type B sounder
device primarily intended for outdoor applications

Note 1 to entry: Type B sounders may be more suitable than type A sounders for some indoor situations where high temperature and/or humidity are present.

3.1.12
volume control
means for adjusting sound pressure level

3.2 Abbreviations

AC Alternating current

AVCP Assessment and verification of constancy of performance

CWFT Classified without Further Testing

DC Direct current

DoP Declaration of performance

MS Member states

NPD No performance determined

RMS Root mean square

SPL Sound pressure level

4 Requirements

4.1 Compliance

In order to comply with this standard, sounders shall meet the requirements of this clause, which shall be verified by visual inspection or engineering assessment and 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 sounder shall be rated for at least 100 h 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 5.2.1.

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 need to meet the requirement of the system.

4.2.2 Provision for external conductors

The sounder, unless it is a radio-linked component not using wires, 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 to the sounder shall be designed so that the conductors are clamped between metal surfaces without being damaged.

This requirement shall be assessed as specified in 5.2.2.

4.2.3 Flammability of materials

Plastic materials used in the construction of sounders shall comply with the following flammability requirements:

a) EN 60695-11-10:2013 Class V-2 or HB75 for devices consuming less than or equal to 15 W of power;

b) EN 60695-11-20:1999 and EN 60695-11-20:1999/A1:2003 Class 5VB for devices consuming more than 15 W of power.

NOTE Annex E gives information on the test requirements and classification given in the European Standards and equivalent flammability ratings in UL 94.

This shall be assessed as specified in 5.2.3.

4.2.4 Enclosure protection

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

a) Type A sounders: Code IP21C of EN 60529:1991 as amended by EN 60529:1991/A1:2000;

b) Type B sounders: Code IP33C of EN 60529:1991 as amended by EN 60529:1991/A1:2000.

This shall be assessed as specified in 5.2.4 and meet the compliance criteria of 5.2.4.3.

4.2.5 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.

NOTE The use of a special tool is intended to discourage unauthorised persons from easily accessing the equipment.

This requirement shall be assessed as specified in 5.2.5.

4.2.6 Manufacturer's adjustment

It shall not be possible to change the manufacturer’s settings or to access the message recording function of voice sounders except by special means (e.g. the use of a special code or tool) or by breaking or removing a seal.

This requirement shall be assessed as specified in 5.2.6.

4.2.7 On-site adjustment of the operation mode

If there is provision for on-site adjustment of the mode of operation of the sounder:

a) For each setting, at which the manufacturer claims compliance with this standard, the sounder shall comply with 4.2.6.

b) Any setting(s), at which the manufacturer does not claim compliance with this standard, shall comply with 4.2.6 and:

    1) for volume controls, the limits of the compliant range of sound pressure levels shall be clearly marked on the sounder and shown in the associated data,

    2) for sound pattern, the compliant setting(s) shall be clearly marked in the associated data.

These adjustments may be carried out at the sounder or at the control and indicating equipment.

This requirement shall be assessed as specified in 5.2.7.

4.2.8 Software controlled sounders

4.2.8.1 General

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

4.2.8.2 Software documentation

4.2.8.2.1 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 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 sounder,

   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 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).

4.2.8.3 Software design

In order to ensure the reliability of the sounder, 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 The storage of program and data

The programme necessary to comply with this standard and any pre-set 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 sounder.

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

4.2.8.5 Assessment

This requirement shall be assessed as specified in 5.2.8.

4.3 Performance parameters under fire conditions

4.3.1 Sound pressure level

The sounder shall produce A-weighted sound pressure levels as declared by the manufacturer.

The manufacturer may declare different sound pressure 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 pressure level of each specimen shall be measured under each mode of operation (see 5.1.2).

When tested in accordance with 5.3.1 the sounder shall produce A-weighted sound pressure levels of at least 65 dB(A) in one direction and the sound pressure level measured at each of the specified angles is not less than that declared by the manufacturer.

4.3.2 Frequencies 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 specific sound pattern. The main sound frequency(ies), frequency range(s) and sound pattern(s) shall be as declared by the manufacturer when tested as specified in 5.3.2.

NOTE Annex D gives information on some of the sound patterns and frequencies used in different European countries and on the international evacuation signal specified in ISO 8201.

4.3.3 Synchronisation

Sounders may interact acoustically when they are installed in close proximity. To prevent this, sounders may have provision for synchronising warning signals and messages with that of other devices. If a synchronisation function is provided, it shall meet the compliance criteria of 5.3.3.

When power interruption is used for synchronisation purposes, this shall not adversely affect the warning signal or the voice message.

NOTE Synchronisation can be achieved by internal circuitry, the addition of a trigger wire connected between devices or by other means as defined by the manufacturer.

4.3.4 Performance of voice sounders

Voice sounders shall be capable of producing an attention-drawing signal, and a voice message or messages. The output level of the voice message relative to the attention drawing signal shall meet the compliance criteria of 5.3.4.

4.3.5 Voice sounders sequence timing

For messages that require immediate action, the broadcast sequence and timings of voice sounders shall be as specified in Table 1.

Table 1 — Voice sounders broadcast sequence and timings

Sequence steps	Duration
a) attention-drawing signal	2 s to 10 s
b) silence	0,25 s to 2 s
c) voice message	≤ 30 s
d) silence	0,25 s to 2 s

The periods of silence may need to be longer than indicated in certain circumstances, for example in spaces with long reverberation times, but shall not be such that the time between the start of each cycle exceeds 30 s.

For messages that do not require immediate action, it is permitted to extend either the silence period after the voice message has ended, or the period within which the message is repeated, or both.

Persons trained in the proper use of microphones should be used to record the messages. The recordings should be made in a room with a controlled acoustic environment having an ambient noise level not greater than 30 dB(A) and a reverberation time not greater than 0,5 s from 150 Hz to 10 kHz.

Voice sounders sequence timing shall meet the compliance criteria of 5.3.5.

4.4 Durability of performance parameters under fire conditions

4.4.1 Temperature resistance

4.4.1.1 Dry heat (operational)

Type A and type B sounders shall function correctly at high ambient temperatures as specified in 5.4.1.1.

4.4.1.2 Dry heat (endurance)

Type B sounders shall be capable of withstanding long term exposure to high temperature as specified in 5.4.1.2.

4.4.1.3 Cold (operational)

Type A and type B sounders shall function correctly at low ambient temperatures as specified in 5.4.1.3.

4.4.2 Humidity resistance

4.4.2.1 Damp heat, cyclic (operational)

Type A and type B sounders shall function correctly at a high level of humidity as specified in 5.4.2.1.

4.4.2.2 Damp heat, steady-state (endurance)

Type A and type B sounders shall be capable of withstanding long term exposure to a high level of continuous humidity as specified in 5.4.2.2.

4.4.2.3 Damp heat, cyclic (endurance)

Type B sounders shall be capable of withstanding the effect of cyclic humidity levels as specified in 5.4.2.3.

4.4.3 Shock and vibration resistance

4.4.3.1 Shock (operational)

Type A and type B sounders shall operate correctly when submitted to mechanical shocks as specified in 5.4.3.1.

4.4.3.2 Impact (operational)

Type A and type B sounders shall operate correctly when submitted to mechanical impacts as specified in 5.4.3.2.

4.4.3.3 Vibration, sinusoidal (operational)

Type A and type B sounders shall operate correctly when submitted to sinusoidal vibration as specified in 5.4.3.3.

4.4.3.4 Vibration, sinusoidal (endurance)

Type A and type B sounders shall be capable of withstanding the effect of sinusoidal vibration as specified in 5.4.3.4.

4.4.4 Corrosion resistance

4.4.4.1 SO_2 corrosion (endurance)

Type A and type B sounders shall be capable of withstanding exposure to an SO_2 corrosive atmosphere as specified in 5.4.4.1.

4.4.5 Electrical stability

4.4.5.1 EMC, immunity (operational)

Type A and type B sounders shall operate correctly when submitted to electromagnetic interference as specified in 5.4.5.1

5 Testing, assessment and sampling methods

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 specimen 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 analysing control signals and triggering the sound operation, in which case the specimen shall be connected to suitable power supply and control equipment as specified 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.

When testing radio-linked sounders, an external power supply set to either the lowest or highest working voltage of the internal batteries may be used in place of the normal internal batteries on radio devices. This external power supply should be such that the maximum current is taken by the alarm device during the test.

If the manufacturer has declared different sound pressure levels for operation under different conditions, then, unless otherwise specified in 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 voltages 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 pressure 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 parts of EN 60068).

If a specific tolerance or deviation limit is not specified in a requirement or test procedure, then a deviation limit of ± 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 10 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 Clause 8.

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

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 2.

All the specimens shall be first submitted to the reproducibility test described in 5.1.7. On completion of the reproducibility test, the specimen with the least loud sound pressure 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.

Where, after one of the test specified in 5.2.1 to 5.4.5.1 the sound pressure level of the specimen differs from that measured during the reproducibility test by more than 6 dB, a new specimen shall be used for the next test on the schedule for that specimen. The sound pressure level shall be first measured as specified in 5.1.7.

The tests on an individual specimen may be carried out in any order except that the reproducibility test (5.1.7) shall be performed first on all specimens and the tests on specimens 1 and 2 shall be carried out in the order listed in Table 2, except for the enclosure protection test (5.2.4) which shall be carried out last.

Table 2 — Schedule of tests

Test	Subclause	Specimen No(s)	
		Type A	Type B
Reproducibility	5.1.7	all	all
Duration of operation	5.2.1	1	1
Enclosure protection	5.2.4	1, 2	1, 2
Sound pressure level	5.3.1[a]	1	1
Synchronisation (where applicable)	5.3.3	1, 2	1, 2
Performance of voice sounders	5.3.4	1	1
Voice sounder sequence timing	5.3.5	1	1
Dry heat (operational)	5.4.1.1	2	2
Dry heat (endurance)	5.4.1.2	-	9
Cold (operational)	5.4.1.3	3	3
Damp heat, cyclic (operational)	5.4.2.1	3	3
Damp heat, steady-state (endurance)	5.4.2.2	3	3
Damp heat, cyclic (endurance)	5.4.2.3	-	10
Shock (operational)	5.4.3.1	4	4
Impact (operational)	5.4.3.2	5	5
Vibration (operational)	5.4.3.3	6	6
Vibration (endurance)	5.4.3.4	6	6
SO_2 corrosion (endurance)	5.4.4.1	7	7
Electromagnetic compatibility (EMC) tests (operational) Electrostatic discharge (operational) Radiated electromagnetic fields (operational) Conducted disturbances induced by electromagnetic fields (operational) Voltage transients, fast transient bursts (operational) Voltage transients, slow high energy voltage surge (operational)	5.4.5.1[b] [c] [c] [c]	8 8 8 8 8	8 8 8 8 8

[a] For voice sounders, only the attention-drawing signal shall be measured

[b] The EMC tests specified in 5.4.5.1 are not required for sounders which do not rely on active electronic components for their operation, e.g. mechanical bells..

[c] These conducted EMC tests are not required for radio-linked sounders that derive their power from internal batteries.

5.1.7 Reproducibility

5.1.7.1 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.

5.1.7.2 Test procedure

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

The measurement shall be recorded in dB(A) for each specimen and the sound pressure level of the loudest and the least loud specimen shall be represented by L_x and L_y respectively.

5.1.7.3 Test requirements

The sounder shall be deemed to comply with the requirement of this clause if the difference between L_x and L_y is less than 6 dB.

5.2 Operational reliability

5.2.1 Duration of operation

5.2.1.1 Object of the test

To show that the sound pressure level does not change significantly after prolonged operation of the sounder.

5.2.1.2 Test procedure

The specimen shall be subjected to the following durability cycle 100 times: the specimen shall be operated for 1 h at the maximum of the supply parameters declared by the manufacturer (see Clause 8) and then shall be left in the non-operating condition for 1 h. The sound pressure level shall be measured as described in Annex B within 1 h of the final period of operation.

When testing radio-linked sounders, an external power supply set to either the lowest or highest working voltage of the internal batteries may be used in place of the normal internal batteries on radio devices. This external power supply should be such that the maximum current is taken by the alarm device during the test.

5.2.1.3 Test requirement

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement at the end of the test cycle (see 5.2.1.2) and the measurement, under the same conditions, during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.2.2 Provision for external conductors

A visual inspection of a specimen shall be conducted to verify that the sounder meet the requirements for the provision for external conductors as specified in 4.2.2.

5.2.3 Flammability of materials

Verification of compliance to the flammability of materials requirements specified in 4.2.3 shall be carried out by examination of test report(s) for the material(s) used in the construction of the enclosure.

NOTE 1 Many manufacturers of plastic materials provide certificate of conformity or test reports against the requirements and tests methods specified in UL 94. These certificates or test reports can be used where they provide equivalent classification to those specified in 4.2.3.

NOTE 2 See Annex E for comparison of the test requirements and flammability classes given in the EN standards specified in 4.2.3 and equivalent flammability categories in UL 94.

5.2.4 Enclosure protection

5.2.4.1 Object of the tests

To demonstrate that the degree of protection provided by the enclosure of the sounder with regard to the ingress of solid foreign objects and the harmful effects due to the ingress of water, meets the minimum requirements of this European Standard (see 4.2.4).

5.2.4.2 Test procedures

5.2.4.2.1 General

The test apparatus and procedures shall be as described in EN 60529:1991 as amended by EN 60529:1991/A1:2000 and in 5.2.4.2.2 to 5.2.4.2.4. The following tests shall be conducted:

a) protection against solid foreign objects indicated by the first characteristic numeral;

b) protection against access to hazardous parts indicated by the additional letter;

c) protection against water indicated by the second characteristic numeral.

For the purpose of this test, the enclosure of the sounder shall be taken as comprising any parts of the outer physical envelope of the device which prevent or restrict access of solid foreign objects to the sound transducer, internal components and cable termination block.

NOTE Due to the invasive nature of the tests, it is preferable that different specimens are used for the test for protection against solid foreign objects and the test for protection against water.

Ingress of liquid inside the enclosure may be possible, but should not adversely affect the operation of the device.

5.2.4.2.2 State of the specimen during conditioning

The specimen under test shall be:

a) un-powered during the test for protection against access to hazardous parts;

b) powered during the test for protection against water.

c) un-powered during the test for protection against solid foreign objects;

The specimen under test shall be mounted as specified in EN 60529:1991 as amended by EN 60529:1991/A1:2000 and shall include all wiring termination boxes which form part of the sounder when installed.

5.2.4.2.3 Conditioning

The test conditions specified in EN 60529:1991 as amended by EN 60529:1991/A1:2000 shall be applied for the following IP Codes:

a) type A: IP21C,

b) type B: IP33C.

5.2.4.2.4 Measurements during conditioning

No measurements are required during the conditioning.

5.2.4.2.5 Final measurements

At the end of the conditioning period for the test for protection against water:

a) the sound pressure level of the specimen shall be measured as described in Annex B;

b) the specimen shall be examined for ingress of water inside the enclosure.

5.2.4.3 Test requirements

The sounder shall be deemed to comply with the requirements of this sub-clause if:

a) the specimen tested complies with the acceptance conditions for the test for protection against solid foreign objects of EN 60529:1991 as amended by EN 60529:1991/A1:2000, 13.3,

b) the specimen tested complies with the acceptance conditions for the test against protection against access to hazardous parts of EN 60529:1991 as amended by EN 60529:1991/A1:2000, 15.3,

c) after the conditioning period for the test for protection against water (see 5.2.4.2.5):

   1) $\Delta(L_{pA})$ between the measurement after the conditioning period and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB, and

   2) no water has penetrated the enclosure or, if water has penetrated the enclosure, the device incorporates adequate provision for drainage.

5.2.5 Access

A visual inspection of a specimen shall be conducted to verify that the sounders meet the requirements for access as specified in 4.2.5.

5.2.6 Manufacturer’s adjustments

A visual inspection of a specimen shall be conducted to verify that the sounders meet the requirements for manufacturer's adjustment as specified in 4.2.6.

5.2.7 On site adjustments of the operating mode

A visual inspection of a specimen shall be conducted to verify that the sounders meet the requirements for on site adjustments of behaviour as specified in 4.2.7.

5.2.8 Requirements for software controlled devices

For sounders that rely on software for their operation, checks of the evidence provided by manufacturer shall be conducted to verify that the device complies with the requirements specified in 4.2.8.

5.3 Performance parameters under fire conditions

5.3.1 Sound pressure level

5.3.1.1 Object of the test

To check that the sound pressure 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.

5.3.1.2 Test procedure

The sound pressure 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 8 f].

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

5.3.1.3 Test requirements

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

a) the A-weighted sound pressure level is greater than 65 dB(A) in at least one direction;

b) the sound pressure level measured at each of the specified angles is not less than that declared by the manufacturer.

5.3.2 Frequencies and sound patterns

Check of the evidence provided by the manufacturer shall be conducted to verify that frequencies and sound patterns are provided as specified in 4.3.2.

5.3.3 Synchronisation

5.3.3.1 Object of the test

To show the ability of sounders that provides a synchronisation function to remain synchronised over time.

5.3.3.2 Test procedure

Install two specimens in separate areas that have no significant acoustic interaction, have a low background noise level and have low reverberation.

If required by their mode of synchronisation, connect a trigger between the two specimens under test.

Place identical microphones 100 mm in front of each specimen. Connect the two microphones to a dual-channel measuring instrument (see Figure 1).

Connect the specimen to a suitable power supply and set it to the minimum voltage declared by the manufacturer.

Carry out the following test cycle:

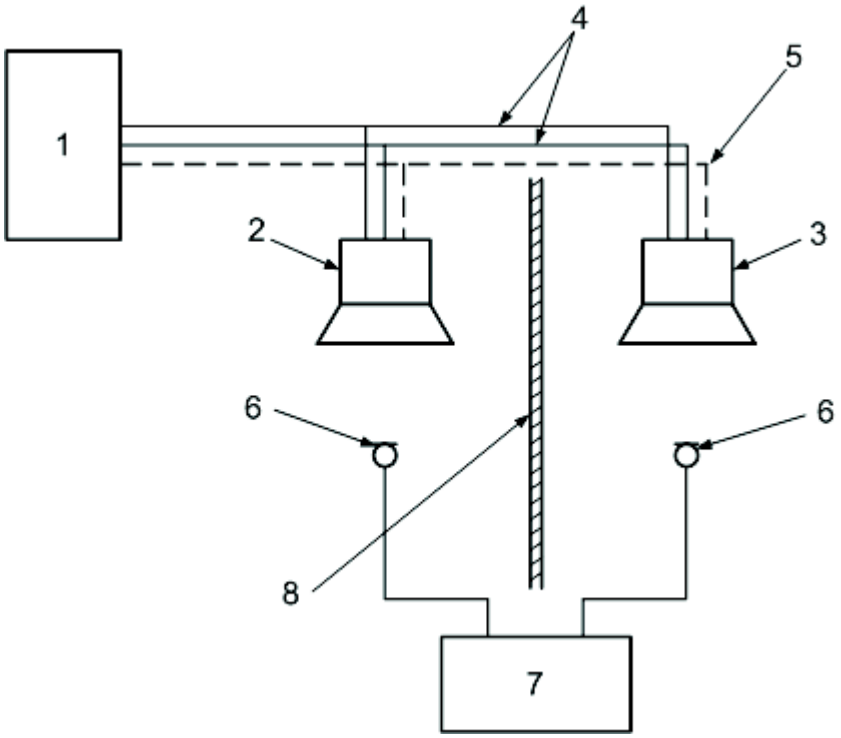
a) activate the specimens such that they operate the same sound pattern or message sequence continuously;

b) over a period of 15 min, measure the time differences between the sound patterns or message sequence from the two specimens at a representative point in the sequence every 5 min;

Repeat the above test cycle with the power supply set to the maximum voltage declared by the manufacturer.

5.3.3.3 Test requirements

The sounder shall be deemed to comply with the requirement of this clause if the time difference, ΔT, between the two specimens is less than 0,05 s for all measurements.



Key

1 power supply/control equipment
2 specimen under test 1
3 specimen under test 2
4 power supply wires (if required)
5 trigger wire (if required)
6 microphones
7 dual channel signal measurement/recording instrument
8 acoustic screen

Figure 1 — Test arrangement to measure synchronisation

5.3.4 Performance of voice sounders

5.3.4.1 Object of the test

To verify that the output level of the voice message in relation to the output level of the attention-drawing signal is sufficiently loud.

5.3.4.2 Test procedure

Measure the sound pressure level of the voice message and that of the attention-drawing signal as specified in Annex A, except that measurements at only 15° and 90° from the axis of the specimen are required. (see Figures A.2 and A.3).

A voice sounder will normally provide a range of messages. Testing for compliance with this test should use a typical message agreed between the manufacturer and the testing authority.

The entire speech message, including any silence periods between word components, should be used when measuring the sound pressure level of the voice message.

For each angle, record the voice message measurements as equivalent sound pressure level, $L_{Aeq,T}$, over the period of the voice message (see 4.3.5).

5.3.4.3 Requirements

For each angle, the $L_{Aeq,T}$ measurement of the voice message shall not be more than 10 dB below the $L_{AFmax,T}$ measurement for the attention-drawing signal.

5.3.5 Voice sounder sequence timing

5.3.5.1 Object of the test

To verify that the signal sequence and timing of the voice message and the attention-drawing signal are within the requirements (see 4.3.5).

5.3.5.2 Test procedure

5.3.5.2.1 Conditioning

The specimen shall be connected to a suitable power supply set to the minimum voltage declared by the manufacturer.

The voice sounder signal sequence shall be activated.

The power supply shall be set to the maximum voltage declared by the manufacturer.

The voice sounder signal sequence shall be activated.

This cycle shall be repeated six times.

5.3.5.2.2 Measurements during conditioning

At each voltage setting, measure the sequence and duration of the attention-drawing signal, silence periods and voice message.

5.3.5.3 Requirements

The measurements of 5.3.5.2.2 shall be within the limits specified in 4.3.5.

5.4 Durability of performance parameters under fire conditions

5.4.1 Heat resistance

5.4.1.1 Dry heat (operational)

5.4.1.1.1 Object of the test

To demonstrate the ability of the sounder to function correctly at high ambient temperatures that may occur for short periods in the service environment.

5.4.1.1.2 Test procedure

5.4.1.1.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-2:2007, Test Bb for non-heat dissipating specimens or Test Bd for heat dissipating specimens, except that the test shall be conducted in a reverberation chamber as described in Annex B, and as described in 5.4.1.1.2.2 to 5.4.1.1.2.5.

5.4.1.1.2.2 State of specimen during conditioning

The specimen shall be mounted in a reverberation chamber as described in Annex B. The specimen shall be maintained in the quiescent state during the conditioning period except during the last hour when it shall be sounding (see 5.1.2).

5.4.1.1.2.3 Conditioning

The air temperature in the reverberation test chamber shall be increased to the test temperature at a rate not exceeding 1°K/min. The test conditions in Table 3 shall be applied.

Table 3 — Conditions for dry heat (operational) test

Environmental type	**Temperature** °C	**Duration** h
A	55 ± 2	16
B	70 ± 2	16

5.4.1.1.2.4 Measurements during conditioning

a) Except during the final 15 min of conditioning, those devices requiring power during the quiescent state (see 5.1.2) shall be monitored for false operations, including alarm or fault signals during the conditioning period,

b) The sound pressure level shall be measured as described in Annex B during the final 15 min of the conditioning.

5.4.1.1.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-2:2007.

5.4.1.1.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operations have been detected during the conditioning period (see 5.4.1.1.2 4 a)); and

b) $\Delta(L_{pA})$ between measurements during the conditioning period (see 5.4.1.1.2.4 b)) and after the recovery period (see 5.4.1.1.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

If the fire alarm device is combined with a heat detector which could operate at (55 ± 2) °C, then the response of the heat detector may be disabled or ignored during the test.

5.4.1.2 Dry heat (endurance)

5.4.1.2.1 Object of the test

To demonstrate the ability of the sounder to withstand long term ageing effects.

5.4.1.2.2 Test procedure

5.4.1.2.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-2:2007, Test Bb for non-heat dissipating specimens or Test Bd for heat dissipating specimens, and in 5.4.1.2.2.2 to 5.4.1.2.2.5.

5.4.1.2.2.2 State of the specimen during conditioning

The specimen shall not be supplied with power during the conditioning.

5.4.1.2.2.3 Conditioning

The air temperature in the reverberation test chamber shall be increased to the test temperature at a rate not exceeding 1°K/min. The test conditions in Table 4 shall be applied.

Table 4 — Conditions for dry heat (endurance) test

Environmental type	**Temperature** °C	**Duration** day
A	No test	No test
B	70 ± 2	21

5.4.1.2.2.4 Measurements during conditioning

No measurements are required during the conditioning.

5.4.1.2.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-2:1993 as amended by EN 60068-2-2:2007.

5.4.1.2.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement after the recovery period (see 5.4.1.2.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.1.3 Cold (operational)

5.4.1.3.1 Object of the test

To demonstrate the ability of the sounder to function correctly at low ambient temperatures appropriate to the anticipated service environment.

5.4.1.3.2 Test procedure

5.4.1.3.2.1 Reference

The test procedure shall be as described in EN 60068-2-1:2007, Test Ab for non-dissipating specimens, or Test Ad for heat dissipating specimens, except that the test shall be conducted in a reverberation chamber as described in Annex B, and in 5.4.1.3.2.2 to 5.4.1.3.2.5.

5.4.1.3.2.2 State of specimen during conditioning

The specimen shall be mounted in a reverberation chamber as described in Annex B. The specimen shall be maintained in the quiescent state during the conditioning period except during the last hour when it shall be sounding (see 5.1.2).

5.4.1.3.2.3 Conditioning

The air temperature in the test chamber shall be reduced to the required test temperature at a rate not exceeding 1 °K/min. The test conditions in Table 5 shall be applied.

Table 5 — Conditions for cold (operational) test

Environmental type	Temperature °C	Duration h
A	−10 ± 3	16
B	−25 ± 3	16
In countries with very cold outside temperatures specific requirement may apply.		

5.4.1.3.2.4 Measurements during conditioning

a) Except during the final 15 min of conditioning, sounders which require power during the quiescent state (see 5.1.2) shall be monitored for false operations, including alarm or fault signals during the conditioning period.

b) The sound pressure level shall be measured as described in Annex B during the final 15 min of the conditioning.

5.4.1.3.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-1:2007.

5.4.1.3.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operations have been detected during the conditioning period (see 5.4.1.3.2.4 a)); and

b) $\Delta(L_{pA})$ between measurements during the conditioning period (see 5.4.1.3.2.4 b)) and after the recovery period (see 5.4.1.3.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.2 Humidity resistance

5.4.2.1 Damp heat, cyclic (operational)

5.4.2.1.1 Object of the test

To demonstrate the immunity of the sounder to an environment with high relative humidity, where condensation may occur on the device.

5.4.2.1.2 Test procedure

5.4.2.1.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-30:2005, using the Variant 2 test cycle and controlled recovery conditions and in 5.4.2.1.2.2 to 5.4.2.1.2.5.

5.4.2.1.2.2 State of the specimen during conditioning

The specimen shall be mounted in a reverberation chamber as described in Annex B. The specimen shall be maintained in the quiescent state during the conditioning period except during the last half-hour when it shall be sounding (see 5.1.2).

5.4.2.1.2.3 Conditioning

The test conditions in Table 6 shall be applied.

Table 6 — Conditions for Damp heat, cyclic (operational) test

Environmental type	Lower temperature °C	Relative humidity (lower temperature) %	Upper temperature °C	Relative humidity (upper temperature) %	Number of cycles
A	25 ± 3	> 80	40 ± 2	93 ± 5	2
B	25 ± 3	> 80	55 ± 2	93 ± 5	2

5.4.2.1.2.4 Measurements during conditioning

During conditioning:

a) except during the final half-hour of conditioning, those devices requiring power during the quiescent state (see 5.1.2) shall be monitored for false operations, including alarm or fault signals during the conditioning period.

b) the specimen shall be checked for audible operation during the final half hour of the high temperature phase in the last cycle.

5.4.2.1.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-30:2005.

5.4.2.1.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operations have been detected (see 5.4.2.1.2.4.a) and the specimen operates correctly (see 5.4.2.1.2.4.b)) during the conditioning period, and

b) $\Delta(L_{pA})$ between measurements after the recovery period (see 5.4.2.1.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.2.2 Damp heat, steady-state (endurance)

5.4.2.2.1 Object of the test

To demonstrate the ability of the sounder to withstand the long-term effects of humidity in the service environment (e.g. changes in electrical properties due to absorption, chemical reactions involving moisture, galvanic corrosion, etc.).

5.4.2.2.2 Test procedure

5.4.2.2.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-78:2013, Test Cab and in 5.4.2.2.2.2 to 5.4.2.2.2.5.

5.4.2.2.2.2 State of the specimen during conditioning

The specimen shall not be supplied with power during the conditioning.

5.4.2.2.2.3 Conditioning

The test conditions in Table 7 shall be applied.

Table 7 — Conditions for Damp heat, steady-state (endurance) test

Environmental type	**Temperature** °C	**Relative humidity** %	**Duration** days
A and B	40 ± 2	93 ± 5	21

5.4.2.2.2.4 Measurements during conditioning

No measurements are required during the conditioning.

5.4.2.2.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-78:2013.

5.4.2.2.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement after the recovery period (see 5.4.2.2.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.2.3 Damp heat, cyclic (endurance)

5.4.2.3.1 Object of the test

To demonstrate the ability of the sounder to withstand the long-term effects of high humidity and condensation.

5.4.2.3.2 Test procedure

5.4.2.3.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-30:2005, using the Variant 1 test cycle and controlled recovery conditions and in 5.4.2.3.2.2 to 5.4.2.3.2.4.

5.4.2.3.2.2 State of the specimen during conditioning

The specimen shall not be supplied with power during the conditioning.

5.4.2.3.2.3 Conditioning

The test conditions in Table 8 shall be applied.

Table 8 — Conditions for Damp heat, cyclic (endurance) test

Environmental type	Temperature °C	Number of cycles
A	No test	No test
B	55 ± 2	6

5.4.2.3.2.4 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the recovery period specified in EN 60068-2-30:2005.

5.4.2.3.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement after the recovery period (see 5.4.2.3.2.4) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.3 Shock and vibration resistance

5.4.3.1 Shock (operational)

5.4.3.1.1 Object of the test

To demonstrate the immunity of the sounder to mechanical shocks, which are likely to occur, albeit infrequently, in the anticipated service environment.

5.4.3.1.2 Test procedure

5.4.3.1.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-27:2009, Test Ea and in 5.4.3.1.2.2 to 5.4.3.1.2.5.

5.4.3.1.2.2 State of the specimen during conditioning

The specimen shall be mounted on a rigid fixture and shall be maintained in the quiescent state during the conditioning period (see 5.1.2).

5.4.3.1.2.3 Conditioning

The test conditions in Table 9 shall be applied.

Table 9 — Conditions for Shock (operational) test

Environmental type	Pulse type	Pulse duration ms	Maximum acceleration related to specimen mass M in kg $m\ s^{-2}$		Number of direction	Number of pulses per direction
			M ≤ 4,75 kg	M > 4,75 kg		
A and B	Half sine	6	$10 \times (100 - 20M)$	No test	6	3

5.4.3.1.2.4 Measurements during conditioning

The specimen shall be monitored for false operation, including alarm or fault signals during the conditioning period and for a further 2 min. after the end of the conditioning period.

5.4.3.1.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the conditioning.

5.4.3.1.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operation or fault signals are detected (see 5.4.3.1.2.4) during the conditioning period; and

b) $\Delta(L_{pA})$ between measurements after the conditioning period (see 5.4.3.1.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.3.2 Impact (operational)

5.4.3.2.1 Object of the test

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

5.4.3.2.2 Test procedure

5.4.3.2.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-75:1997 Test. Eh and in 5.4.3.2.2.2 to 5.4.3.2.2.5.

5.4.3.2.2.2 State of the specimen during conditioning

The specimen shall be maintained in the quiescent state during the conditioning period (see 5.1.2).

5.4.3.2.2.3 Conditioning

Impact shall be applied to each accessible surface of the specimen at any point(s) considered likely to suffer damage or to impair the operation of the specimen. The test conditions in Table 10 shall be applied.

Table 10 — Conditions for Impact (operational) test

Environmental type	Impact energy J	Number of impacts per accessible point
A and B	0,5 ± 0,04	3

5.4.3.2.2.4 Measurements during conditioning

The specimen shall be monitored for false operation, including alarm or fault signals during the conditioning period and for a further 2 min. after the end of the conditioning period.

5.4.3.2.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the conditioning.

5.4.3.2.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operation or fault signals are detected (see 5.4.3.2.2.4) during the conditioning period; and

b) $\Delta(L_{pA})$ between measurements after the conditioning period (see 5.4.3.2.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.3.3 Vibration, sinusoidal (operational)

5.4.3.3.1 Object of the test

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

5.4.3.3.2 Test procedure

5.4.3.3.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-6:2008, Test Fc and in 5.4.3.3.2.2 to 5.4.3.2.2.5.

5.4.3.3.2.2 State of the specimen during conditioning

The specimen shall be mounted on a rigid structure and 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.

The specimen shall be maintained in the quiescent state during the conditioning period (see 5.1.2).

5.4.3.3.2.3 Conditioning

The test conditions in Table 11 shall be applied.

Table 11 — Conditions for vibration, sinusoidal, (operational) test

Environmental type	Frequency range Hz	Acceleration amplitude m s^{-2} {g_n}	Number of axis	Sweep rate octave/min	Number of sweep cycles per axis per functional conditions (see 5.4.3.3.2.2)
A and B	10 to 150	5 {0,5}	3	1	1
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 needs then be made.					

5.4.3.3.2.4 Measurements during conditioning

The specimen shall be monitored during the conditioning period to detect false operation, including alarm or fault signals when in the quiescent state and interruption of sound output when sounding.

5.4.3.3.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the conditioning.

5.4.3.3.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if:

a) no false operation or fault signals are detected when in the quiescent state and no interruption of sound output are detected when sounding during the conditioning period (see 5.4.3.3.2.4); and

b) $\Delta(L_{pA})$ between measurements after the conditioning period (see 5.4.3.3.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.3.4 Vibration, sinusoidal (endurance)

5.4.3.4.1 Object of the test

To demonstrate the ability of the sounder to withstand the long term effects of vibration at levels appropriate to the service environment.

5.4.3.4.2 Test procedure

5.4.3.4.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-6:2008, Test Fc and in 5.4.3.4.2.2 to 5.4.3.4.2.4.

5.4.3.4.2.2 State of the specimen during conditioning

The specimen shall be mounted on a rigid fixture and 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.

The specimen shall be un-powered during the conditioning.

5.4.3.4.2.3 Conditioning

The test conditions in Table 12 shall be applied.

Table 12 — Conditions for Vibration, sinusoidal, (endurance) test

Environmental type	Frequency range Hz	Acceleration amplitude $m\ s^{-2}$ {g_n}	Number of axis	Sweep rate octave/min	Number of sweep cycles per axis (see 5.4.3.4.2.2)
A and B	10 to 150	10 {1}	3	1	20
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 needs then be made.					

5.4.3.4.2.4 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the conditioning.

5.4.3.4.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement after the conditioning period (see 5.4.3.4.2.4) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.4 Corrosion resistance, SO_2 corrosion (endurance)

5.4.4.1 Object of the test

To demonstrate the ability of the sounder to withstand the corrosive effect of sulfur dioxide as an atmospheric pollutant.

5.4.4.2 Test procedure

5.4.4.2.1 Reference

The test apparatus and procedure shall be as described in EN 60068-2-42:2003, except for the relative humidity of the test atmosphere, which shall be maintained at (93 ± 5) % instead of (75 ± 5) % and in 5.4.4.2.2 to 5.4.4.2.4.

5.4.4.2.2 State of the specimen during conditioning

Specimens that rely on cables for signal and/or power for their operation shall have un-tinned copper wires, of appropriate diameter, connected to sufficient terminals to allow the functional test to be made after conditioning, without making further connections to the specimen.

The specimen shall not be supplied with power during the conditioning.

5.4.4.2.3 Conditioning

The test conditions in Table 13 shall be applied.

Table 13 — Conditions for Sulfur dioxide (SO_2) corrosion (endurance) test

Environmental type	Sulfur dioxide content µl/l	Temperature °C	Relative humidity %	Duration day
A and B	25 ± 5	25 ± 2	93 ± 5	21

5.4.4.2.4 Final measurements

Immediately after the conditioning the specimen shall be subjected to a drying period of 16 h at (40 ± 2) °C, and relative humidity 50 %, followed by a recovery period of 1 to 2 h at the standard atmospheric conditions.

The sound pressure level of the specimen shall be measured as described in Annex B after the specified recovery period.

5.4.4.3 Test requirements

The sounder shall be deemed to comply with the requirements of this clause if $\Delta(L_{pA})$ between the measurement after the recovery period (see 5.4.4.2.4) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

5.4.5 Electrical stability

5.4.5.1 EMC, immunity (operational)

5.4.5.1.1 Object of the tests

To demonstrate the immunity of the sounder to electromagnetic disturbances appropriate to the service environment.

5.4.5.1.2 Test procedures

5.4.5.1.2.1 Reference

EMC, immunity tests shall be carried out as described in EN 50130-4:2011. The following tests shall be conducted:

a) Electrostatic discharge;

b) Radiated electromagnetic fields;

c) Conducted disturbances induced by electromagnetic fields;

d) Fast transient burst;

e) Slow high energy voltage surges.

5.4.5.1.2.2 State of the specimen during conditioning

a) For tests a), d) and e) in 5.4.5.1.2.1, the conditioning shall be applied to the specimen only in the quiescent state.

b) For tests b) and c) in 5.4.5.1.2.1, the conditioning shall be applied to the specimen in both the quiescent state and when sounding.

5.4.5.1.2.3 Conditioning

The tests conditions specified in EN 50130-4:2011 for the tests listed in 5.4.5.1.2.1 shall be applied.

5.4.5.1.2.4 Measurements during conditioning

During the conditioning period, the specimen shall be monitored to detect false operation, including alarm or fault signals when in the quiescent state and interruption of sound output when sounding.

NOTE 1 Interruption of sound output means that the specimen stops sounding altogether during conditioning. Any variations in volume, tone or pattern during conditioning are allowed.

NOTE 2 It may be necessary to dwell at anomalies to confirm performance of the specimen.

5.4.5.1.2.5 Final measurements

The sound pressure level of the specimen shall be measured as described in Annex B after the conditioning.

5.4.5.1.3 Test requirements

For these tests the criteria for compliance specified in EN 50130-4:2011 and the following shall apply:

a) no false operation or fault signals and, when sounding, no interruption of sound output are detected during the conditioning period (see 5.4.5.1.2.4), and

b) $\Delta(L_{pA})$ between measurements after the conditioning period (see 5.4.5.1.2.5) and the measurement during the reproducibility test (see 5.1.7) for that specimen is smaller than or equal to 6 dB.

6 Assessment and verification of constancy of performance (AVCP)

6.1 General

The compliance of the sounders with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of product type,

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system 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 AVCP system means testing by an independent third party under the responsibility of a notified product certification body.

For the purpose of assessment manufacturer's products may be grouped into families where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified sounders (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the sounder design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the manufacturer to ensure that the sounder as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of sounders to be tested/assessed shall be in accordance with Table 14.

Table 14 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Operational reliability	*4.2*	*5.2*	*2*	*4.2*
Performance parameters under fire conditions	*4.3*	*5.3*	*1 (2)*[a]	*4.3*
Durability of performance parameters under fire conditions	*4.4*	*5.4*	*8 (10)*[b]	*5.4*

[a] *2 samples are required for testing the synchronisation function (if provided)*

[b] *8 samples are required for Type A sounders and 10 samples are required for Type B sounders. Samples may be used for more than one test/assessment where tests are judged to be non-destructive or not affecting performance.*

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the sounders to which they relate.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of:

— procedures,

— regular inspections and tests or assessments or both.

— the use of the results to control:

  — raw and other incoming materials or components,

  — equipment,

  — the production process and the product.

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 factory production control system documentation shall:

— ensure a common understanding of the evaluation of the constancy of performance,

— enable the achievement of the required product performances,

— enable 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 compliance of the product with the declared performance(s) of the essential characteristics.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the FPC. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process and the FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

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.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated or verified or both and regularly inspected according to documented procedures, frequencies and criteria to ensure consistency with the monitoring and measuring requirements. All calibrated or verified equipment shall have identification in order to determine their status.

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Traceability and marking

Individual products shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the declared performance of the characteristics is maintained. The characteristics, and the means of control, are indicated in Clauses 4 and 5.

6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying 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 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.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall:

— address this European Standard, and

— ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific test plan, which identifies procedures to demonstrate compliance 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 in the test plan, and/or

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

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 compliance of the product as if 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.

6.3.4 Initial inspection of factory and FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalised and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented,

and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice

and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP 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 and implemented.

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.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once a year.

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

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

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 the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type as described in 6.2.1.

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.

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

6.3.7 One-off products, pre-production products, (e.g. prototypes) and products produced in very low quantities

The sounder produced as a one-off, prototypes assessed before full production is established and products produced in very low quantities (less than 50 per year) are assessed as follows:

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

— in the case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The FPC-documentation and the factory shall be assessed.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard will be available, and

b) that the FPC procedures in accordance with the FPC documentation will be implemented and followed in practice, and

c) that procedures are in place to demonstrate that the factory production processes can produce a component complying with the requirements of this European Standard and that the component will be the same the samples used for the determination of the product type, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.

7 Classification and designation

No classification of sounders is specified in this European Standard.

8 Marking, labelling and packaging

Each sounder shall be clearly marked with the following information:

a) number and date of this standard (i.e. EN 54-3:2014);

b) name or trademark of the manufacturer or supplier;

c) manufacturer or supplier model designation (type or number);

d) environmental type, [i.e. Type A or Type B (see Clause 3)];

e) terminal designations where applicable;

f) rated supply voltages or voltage ranges (AC. or DC.) where applicable:

NOTE 1 For sounders used in an addressable system, it may not be relevant to declare the supply voltage range as the system configuration and the loading of addressable circuit(s) is configured at the control and indicating equipment.

g) 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 visible during installation and shall be accessible during maintenance.

The markings shall not be placed on screws or other easily removable parts.

NOTE 2 The marking requirement in this clause may be verified by Inspection of manufacturing drawings or artwork representative of the product marking.

Where regulatory marking provisions require information on some or all items listed in this clause, the requirements of this clause concerning those common items are deemed to be met.

The sounders shall either be supplied with sufficient data to enable their correct operation or, if all of these data are not supplied with each sounder reference to the appropriate data sheet(s) or technical manual shall be given on, or with each sounder.

NOTE 3 Further data also considered beneficial when installing, maintaining and operating the sounders are given in Annex C.

Annex A
(normative)

Sound pressure level for fire alarm sounders

A.1 General

This annex specifies the test conditions that apply to the performance tests in 5.3.1 and 5.3.4. The specimen to be tested shall be mounted as described in A.2 and placed in a free field or simulated free field condition.

An environment shall be considered to be equivalent to a free-field environment if the sound pressure decreases with the distance r from a point source according to a 1/r law, with an accuracy of ± 10 %, in the region that will be occupied by the sound field between the specimen to be tested and the measuring microphone. Free-field environment conditions shall be deemed to exist if this requirement is met along the axes joining the measuring microphone and the reference point on the specimen to be tested.

NOTE An anechoic room or quiet outdoor spaces are regarded as being free-field environments.

Free-field conditions shall exist over the whole frequency range of measurement.

A.2 Mounting arrangements

A.2.1 The manufacturer's normal mounting conditions shall be simulated.

A.2.2 For surface mounted devices, the specimen shall be rigidly mounted on a smooth flat block with dimensions as specified in Figure A.1. The mounting block shall be of a material of thickness adequate to ensure negligible vibration such as plywood of at least (19 ± 2) mm The surface of the mounting block shall be reflective with a coefficient of absorption less than 0,15 at 1 kHz.

NOTE A suitable mounting arrangement is shown in Figure A.1.

A.2.3 For pole mounted devices, the specimen shall mounted by its normal means to a suitable rigid structure with sufficient mass to resist the inertial effect of the specimen to be tested. Care shall be taken to ensure that the mounting structure does not obstruct the measurement field.

A.3 Instrumentation

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

A.4 Background noise level

Measurement shall be deemed valid if, at the microphone positions, the background A-weighted sound pressure level is at least 10 dB below the nominal A-weighted sound pressure level of the device under test.

A.5 Measurement of sound pressure level

A.5.1 Two different methods apply to sound pressure level measurement:

a) for sounder tones including the attention-drawing signal of voice sounders, the $L_{AFmax,T}$ shall be measured during at least a complete cycle of the sound pattern

NOTE A measurement using a Fast Time weighting characteristic gives a more accurate result.

b) for messages from voice sounders, the $L_{Aeq,T}$ shall be measured over the period of the voice message (see 4.3.5).

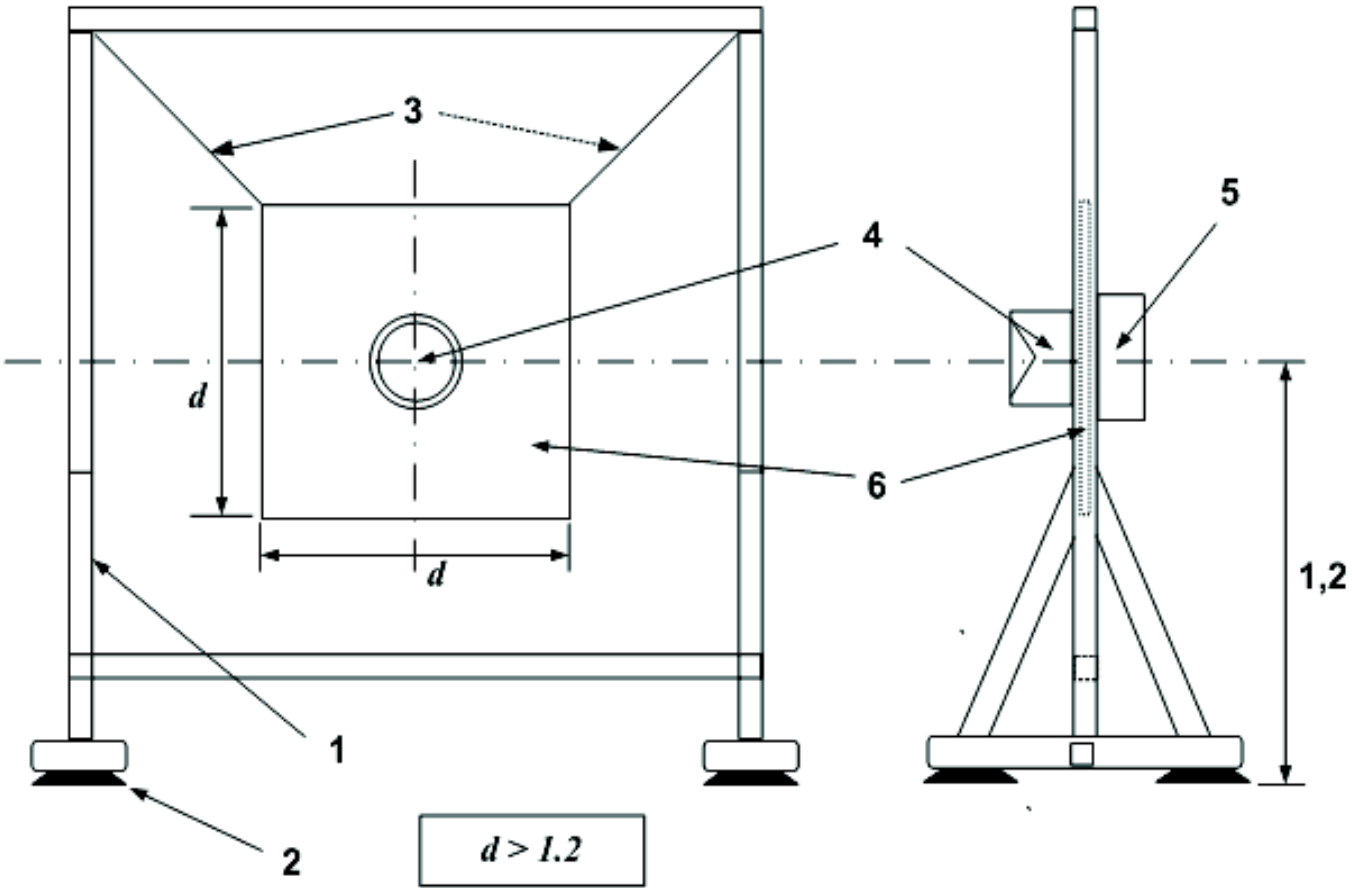
A.5.2 One value of sound pressure level shall be taken at a radius of 3 m from the reference point of the device for each of the following microphone positions:

a) surface mounted device: at 30° intervals from 15° to 165° through a semi-circular arc centred at the reference point of the device for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Figure A.2).

b) pole mounted device: at 30° intervals through a 360° circle centred at the reference point of the device, for two perpendicular planes corresponding to the horizontal and vertical planes of the device in its designed position (see Figure A.3).

A.5.3 The A-weighted sound pressure level at 1 m shall be derived by adding a conversion factor of 9,54 dB to the value obtained at 3 m.

Dimensions in metres



Key

1 timber construction suitable for load

2 shock pads to minimize vibration transmission

3 suspension wires

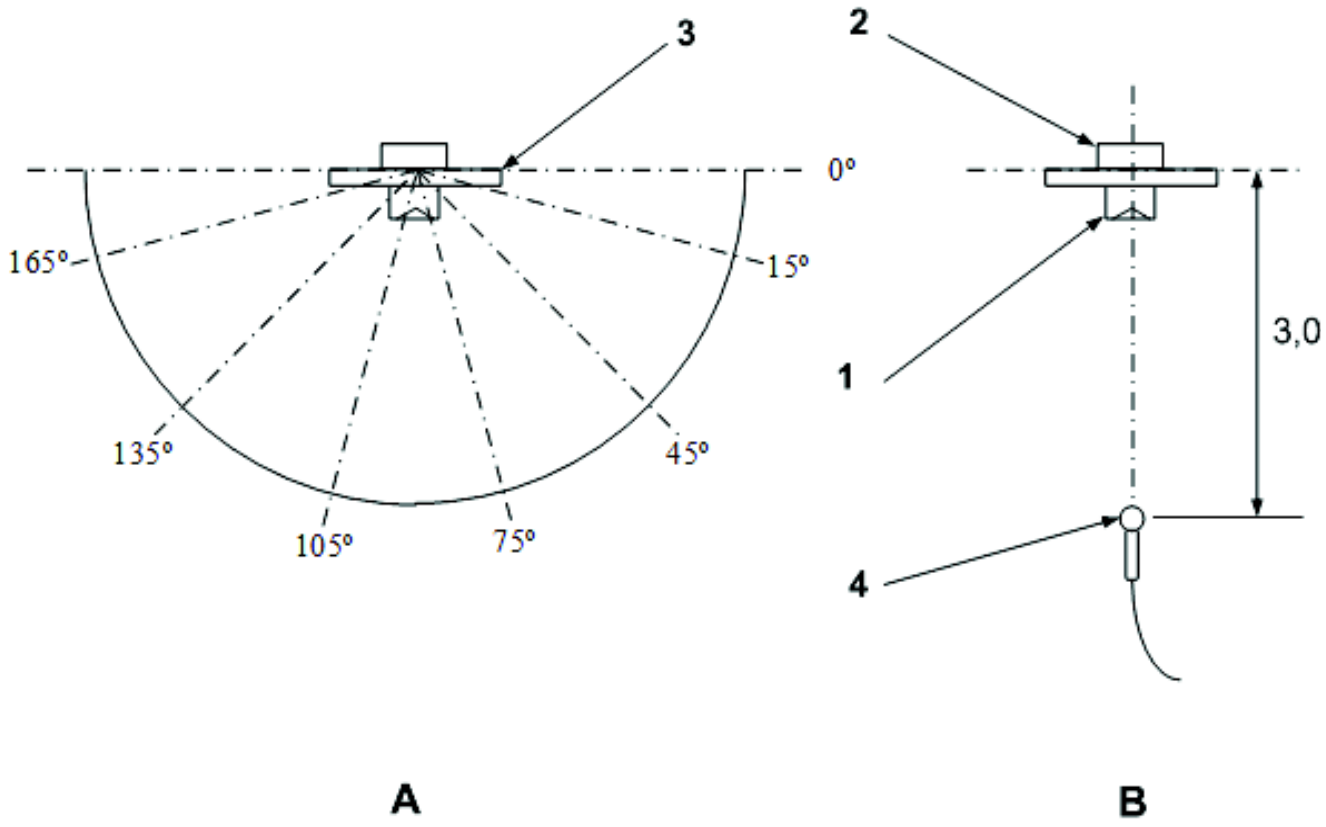
4 alarm device – sounder

5 balancing mass

6 mounting block

Figure A.1 — Suggested method of mounting

Dimensions in metres



Key

A plan view

B side view

1 sounder under test

2 balancing mass

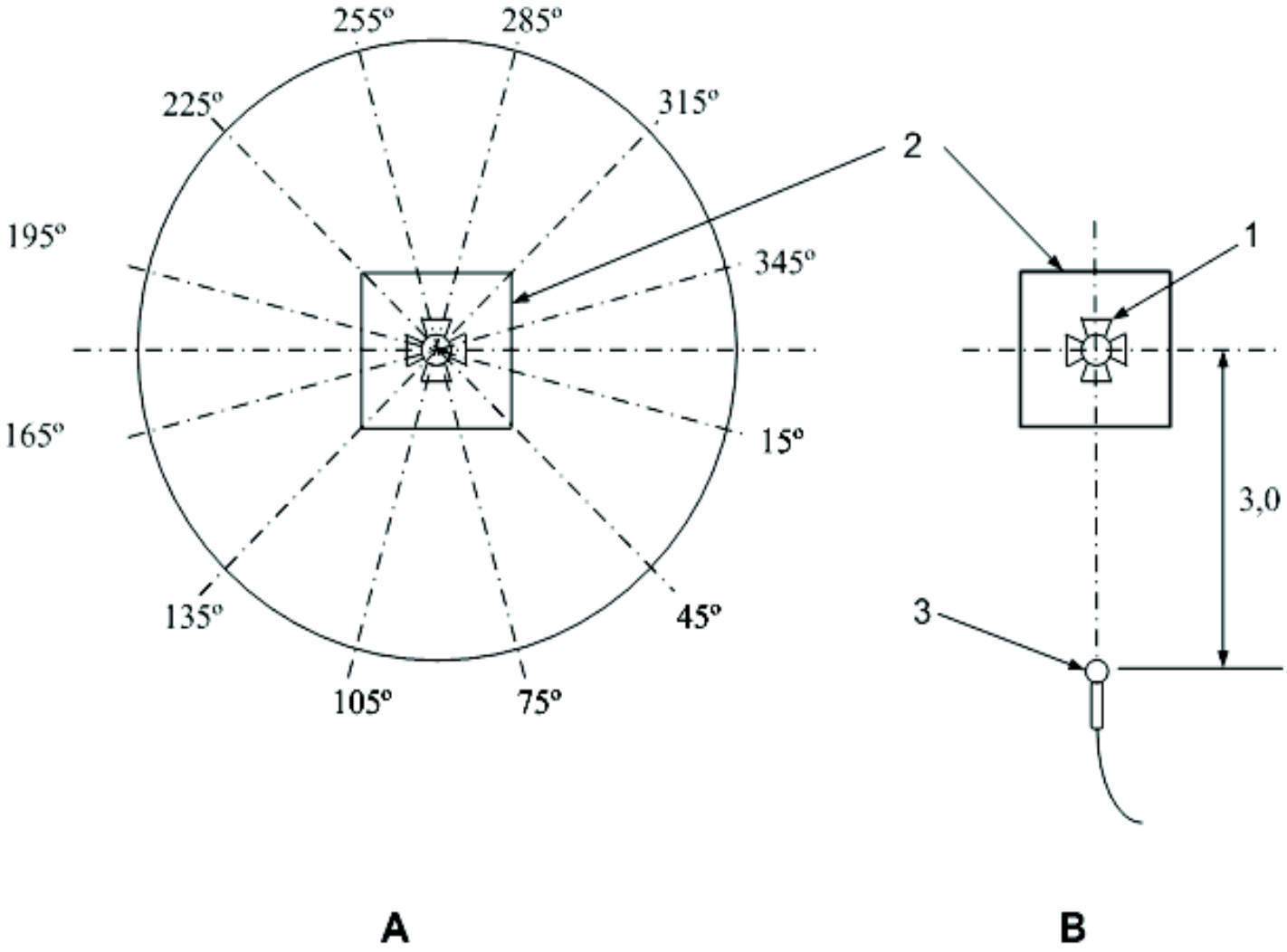
3 mounting block

4 microphone connected to sound level meter

Alarm device may be rotated 90° to carry out measurements in the vertical plane.

Figure A.2 — Measurement positions - surface mounted devices

Dimensions in metres



Key

A radial view

B side view

1 sounder under test

2 Mounting block

3 microphone connected to sound level meter

Alarm device may be rotated 90° to carry out measurements in the vertical plane.

Figure A.3 — Measurement positions - pole mounted devices

Annex B
(normative)

Comparative sound pressure level test during environmental conditioning

B.1 General

B.1.1 The test chamber and sound pressure level measurement method described are for carrying out comparative assessment of the performance of fire alarm sounders before, during and following the environmental conditioning specified in this standard (see 5.1.7, 5.2.1, 5.2.4, 5.4.1.1, 5.4.1.2, 5.4.1.3, 5.4.2.1, 5.4.2.2, 5.4.2.3, 5 4.3.1, 5.4.3.2, 5.4.3.3, 5.4.3.4, 5.4.4.1 and 5.4.5.1).

B.1.2 The specimen to be tested shall be placed in a reverberation test chamber as described in B.2 which shall have a sufficiently uniform repartition of sound energy throughout its volume to ensure consistent reading of sound pressure for differing environmental conditioning.

NOTE As the test method is concerned with establishing comparative test results on a single device, some of the parameters which would apply to the design of reverberation chambers for precision measurement have been relaxed.

The same test chamber construction and the same mounting conditions shall be used for all tests carried out on a given specimen and these shall be fully described in the test report.

B.2 Test chamber

B.2.1 Size

The volume of the test chamber expressed in m^3 shall not be less than 0,5 or $125 \times 10^6 / f^3$ where 90 % of the sound power is at frequencies above *f*, whichever is greater.

The specimen to be tested shall not exceed 5 % of the volume of the test chamber.

B.2.2 Shape

The test chamber shall have six walls and shall be constructed so that either:

a) no surfaces are parallel, the angles between each surface are such as to minimize the resonant mode and the maximum length, width and height are the same; or

b) it is rectangular and the ratio of the length of each side, y/x and z/x conforms to the value in Table B1.

Table B.1 — Ratios of lengths

y/x	z/x
0,83	0,47
0,83	0,65
0,79	0,63

NOTE Examples of suitable test chambers of the type described in B.2.2 a) and B.2.2.b) are shown in Figure B.1 and Figure B.2 respectively.

B.2.3 Rigidity

The materials used, the thickness of each wall and the way the walls are joined shall be adequate to minimize measuring uncertainties caused by induced vibrations.

For example, a chamber constructed of marine plywood with a minimum thickness in mm of 25 or $25V^{1/3}$ (where V is the volume of the chamber in m^3) whichever is greater, and with walls joined together using a recognized carpentry joint supplemented by a suitable waterproof adhesive and screws is suitable.

Where removable panels are provided to permit the mounting of the specimen under test and other measuring equipment, these shall be of the same material and thickness as the rest of the chamber and be secured in place along the perimeter of the aperture at intervals not greater than 100 mm.

B.2.4 Surface treatment

The inner surface of each side of the chamber shall be equally reflective with an average absorption coefficient not exceeding 0,06 within the frequency band of interest. For example, the use of a Formica laminate bonded to plywood walls is suitable.

B.3 Mounting arrangements

The specimen to be tested shall be rigidly mounted by its normal means to the centre of one of the walls of the chamber.

B.4 Instrumentation

The basic instrumentation shall consist of a rotating microphone, an amplifier with A-weighting network, a squaring and averaging circuit and an indicating device. A sound level meter conforming to EN 61672-1:2003 Class 2 or better is suitable.

NOTE If, at extremes of environmental conditioning, e.g. temperature or humidity, the sensitivity of the complete instrument including the microphone is outside the specified value for the type of equipment used, it will be necessary to take into account the correction information provided by the manufacturer of the instrument.

B.5 Background noise level

Measurements are deemed valid if, at the microphone positions, the background A-weighted sound pressure level is at least 10 dB below the nominal A-weighted sound pressure level of the device under test.

B.6 Test procedure

B.6.1 Number and positioning of microphones

In order to reduce the effect of non-uniformity within the chamber, measurements shall be made with a rotating microphone over a circumference having a diameter of not less than 300 mm.

The microphone traverse shall not lie in any plane within 10° of a surface of the chamber. No point on the traverse shall be closer than $\lambda/4$ where λ is the wavelength of the lowest frequency range of interest, to any wall of the chamber.

The minimum distance in m between any microphone position and the specimen under test shall not be less than $0{,}3V^{1/3}$ where V is the volume of the test chamber in m^3.

The same microphone arrangement shall be used for all the tests carried out on a given specimen and this shall be fully described in the test report.

Care should be exercised in mounting the microphone to eliminate interferences from connecting cables and from vibrations that may be induced by the test chamber and/or the rotating mechanism.

B.6.2 Measurement of sound pressure level

The sound pressure level shall be measured by averaging the A-weighted sound pressure level for a whole number of revolutions of the microphone, either in a continuous sweep or at, at least, eight evenly distributed positions per revolution. For voice sounder the attention-drawing signal, not the message shall be used.

If the measurement is made in a continuous sweep, then the measuring path shall be traversed by the microphone at a constant speed, such that a single period of the microphone traverse shall not be less than 60 s. The average sound pressure level ~~ex~~pressed in dB is measured as the L_{AeqT}.

If the measurement is made at, at least, eight evenly distributed positions, the maximum A-weighted sound pressure level shall be measured at each point using the F (Fast) detector indicator characteristic. The measurement at each point shall be made for a period of (60/n)s (where n is the number of points) or for at least a complete cycle of the sound pattern whichever is the greater.

$$\bar{L} = 10 \log \frac{1}{n} \left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \ldots\ldots 10^{\frac{L_n}{10}} \right)$$

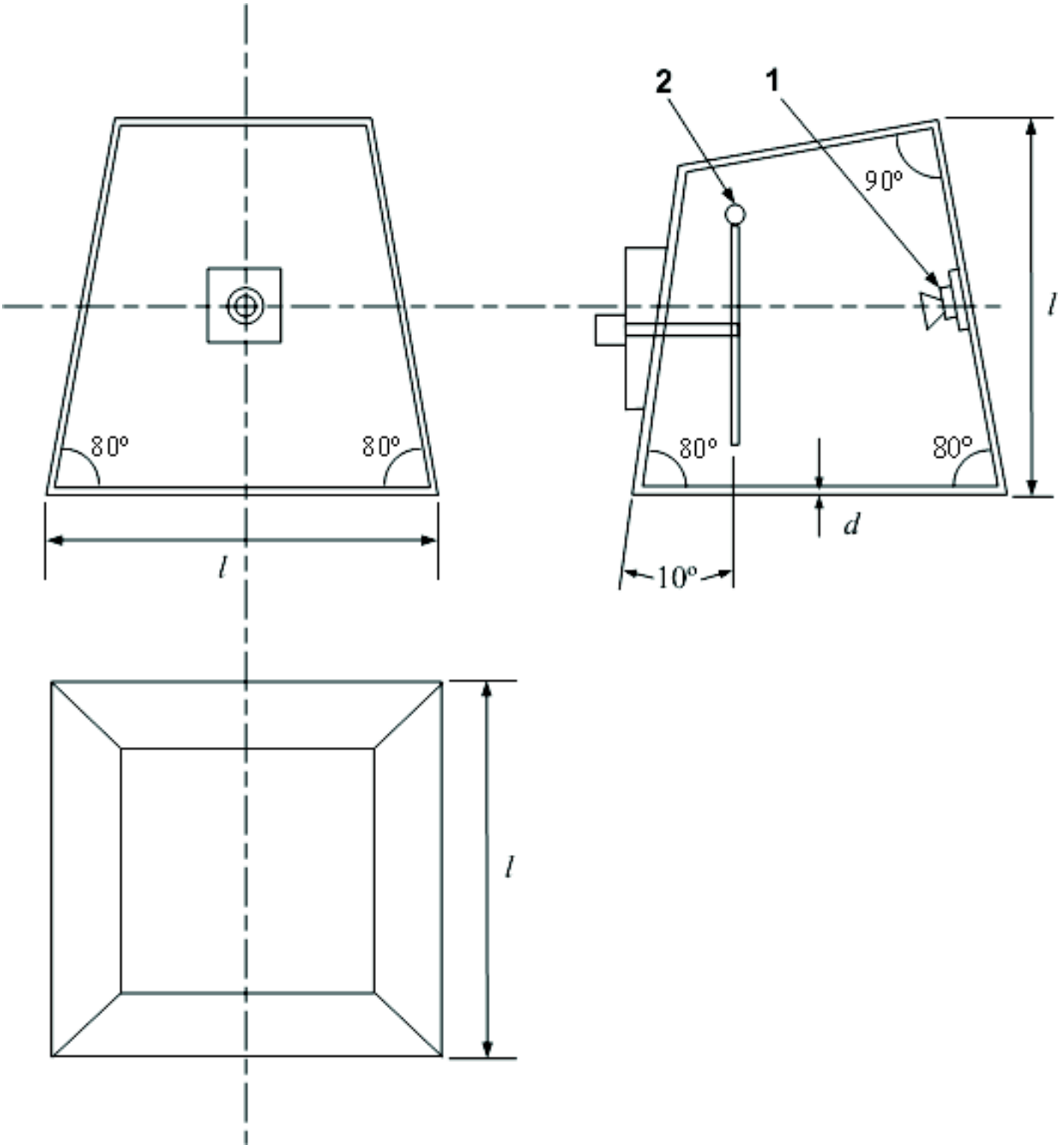
Where:

$\bar{L}$ = the average sound pressure level

L_1, L_2, ….L_n = the individual sound pressure levels;

n = the number of individual sound pressure levels to be averaged.

NOTE The term L is used as an abbreviation of $L_{AFmax,T}$.



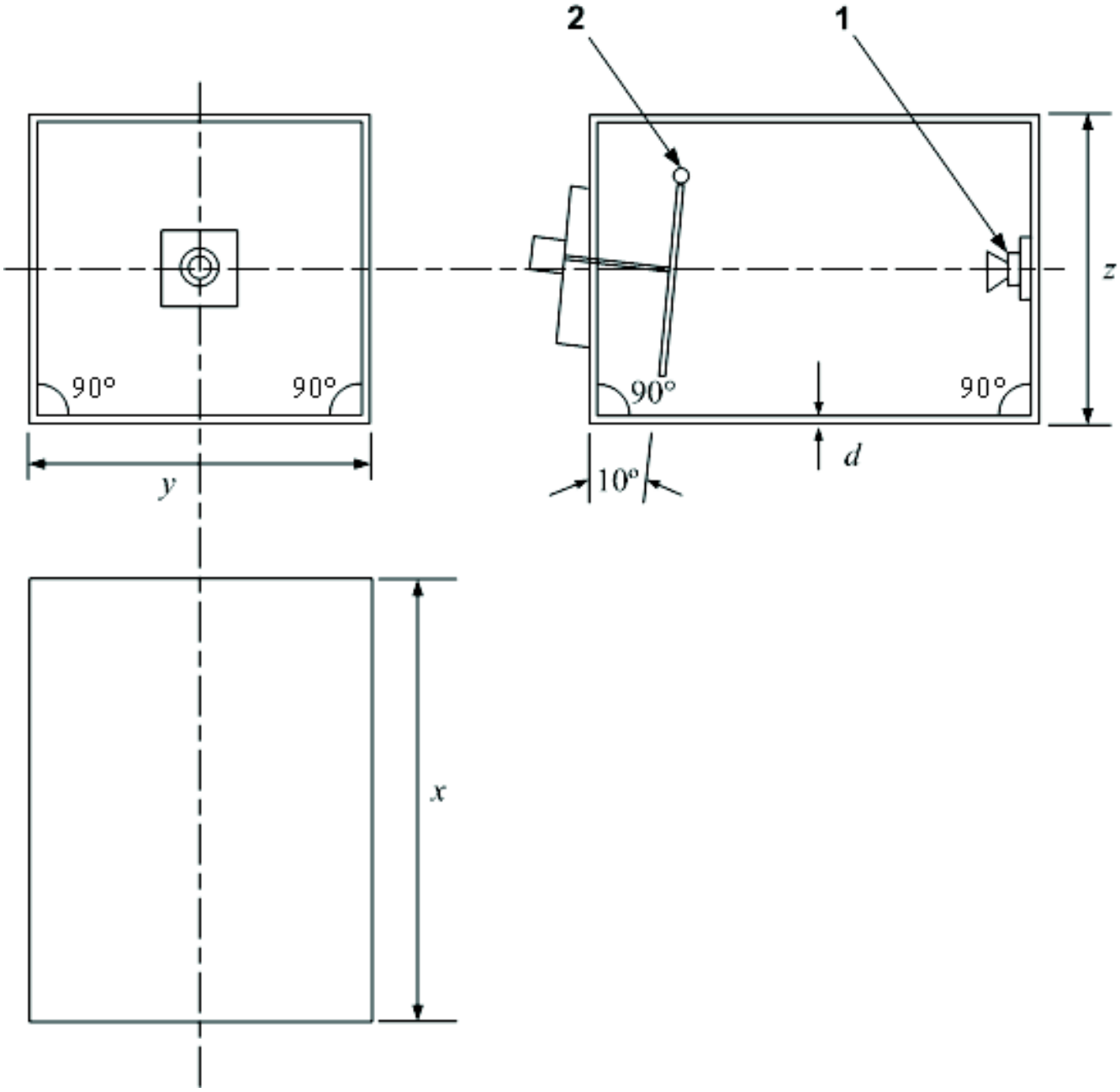
Key

1 sounder under test

2 rotating microphone

d ≥ 25 mm

Figure B.1 — Example of reverberation chamber as described in B.2.2.a)



Key

1	specimen under test
2	rotating microphone
d	≥ 25 mm
y/x	0,83
z/x	0,65

Figure B.2 — Example of reverberation chamber as described in B.2.2.b)

Annex C
(informative)

Data supplied with sounders

To ensure correct operation of sounders, manufacturers should make available, in addition to the marking information listed in Clause 8, the following data:

a) operating voltage range(s) where applicable;

b) maximum and/or average current consumption, where applicable;

NOTE For sounders used in an addressable system, it may not be relevant to declare the current consumption as the system configuration and the loading of addressable circuit(s) is configured at the control and indicating equipment.

c) for all specified modes of operation for which compliance with this standard is claimed, the minimum A-weighted sound pressure level in dB(A) 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 centred 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 Figure A.2),

   2) pole mounted device: at 30° intervals through a 360° circle centred at the intersection of the horizontal plane containing its principal axis and the vertical line through the geometric 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 Figure A.3);

d) frequency(ies) and sound pattern(s) that comply with this standard and, where applicable, sound pattern(s) that comply with national standards;

e) IP code to EN 60529:1991 as amended by EN 60529:1991/A1:2000;

f) instructions on the method for recording and loading messages, where applicable;

g) instructions on the method for synchronising sounders, where the synchronisation option is provided;

In addressable systems, synchronisation of sounders may be an automatic function provided by the control and indicating equipment and specific instructions are not required.

h) any other information necessary to allow correct installation, operation and maintenance of the device.

This data may be supplied with the device, or may be given in a data sheet or technical manual identified on, or with each device.

Annex D
(informative)

Sound patterns used in some European countries

D.1 Introduction

This European Standard does not specify a minimum and maximum frequency or specific sound patterns but requires only that this is declared by the manufacturer (see 4.3.2). This annex is intended to inform on the specific frequencies of sound and sound patterns which are used in some European countries. It also provides information on the international evacuation signal specified in ISO 8201. The list in Table D.1 is informative and is not exhaustive.

D.2 Standards references

Table D.1 — List of references for European sound patterns

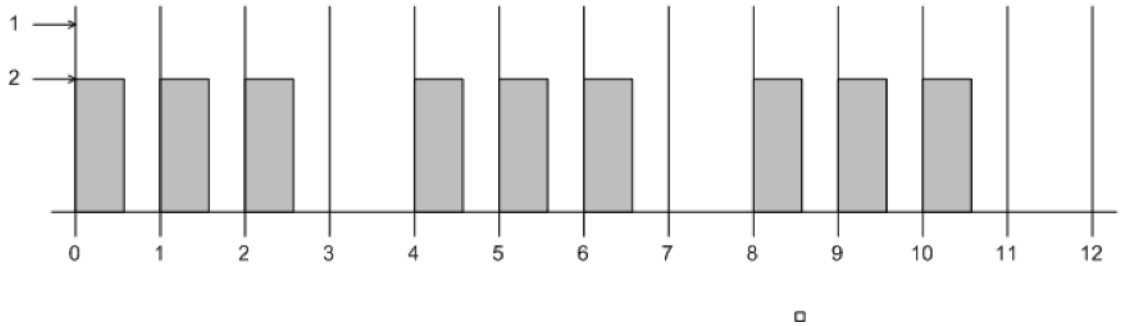
Reference	Title	Country of origin
ISO 8201	Acoustics - Audible emergency evacuation signal	International Standard
DIN 33404–3	Danger signals for workplaces; auditory danger signals; unified emergency signal; technical requirements of safety, testing	Germany
BS 5839–1	Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance	United Kingdom
NF S32–001	Audible emergency evacuation signal	France
NEN 2575	Fire safety of buildings – Evacuation alarm installations – System and quality requirements and guidelines for locating of alarm devices	The Netherlands

D.3 Information on sound patterns

D.3.1 Introduction

The drawings in this clause give a general indication about the sound patterns used in the countries. Reference to the documents listed in Table D.1 should be made for definitive information.

D.3.2 ISO 8201 Evacuate signal



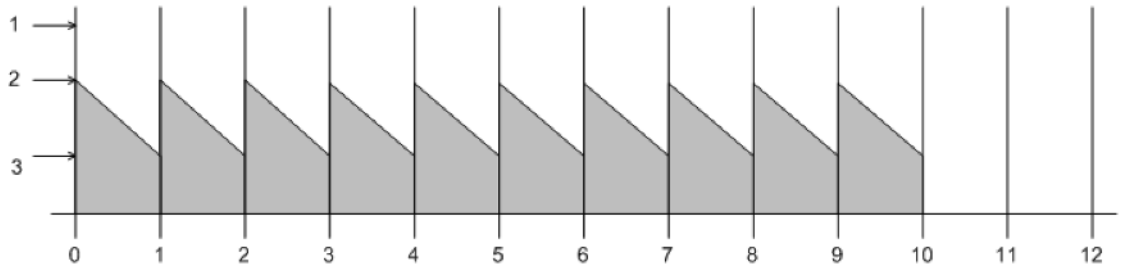
Key

1 Frequency

2 not specified

Figure D.1 — ISO 8201 Evacuate signal

D.3.3 DIN 33404-3 Unified emergency signal



Key

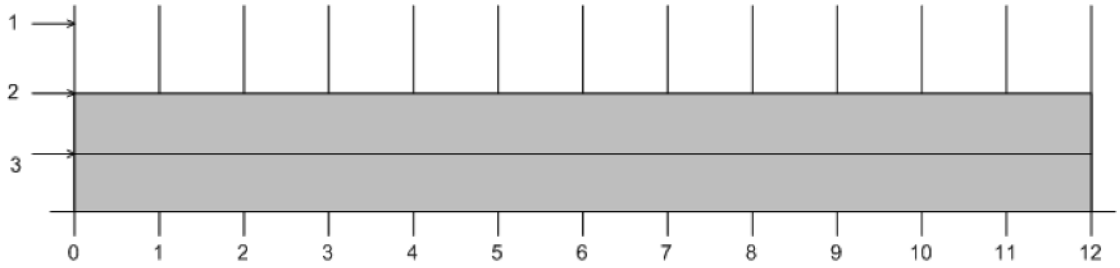
1 Frequency

2 1,200 Hz

3 500 Hz

Figure D.2 — DIN 33404-3 Unified emergency signal

D.3.4 BS 5839-1 Evacuate signal



Key

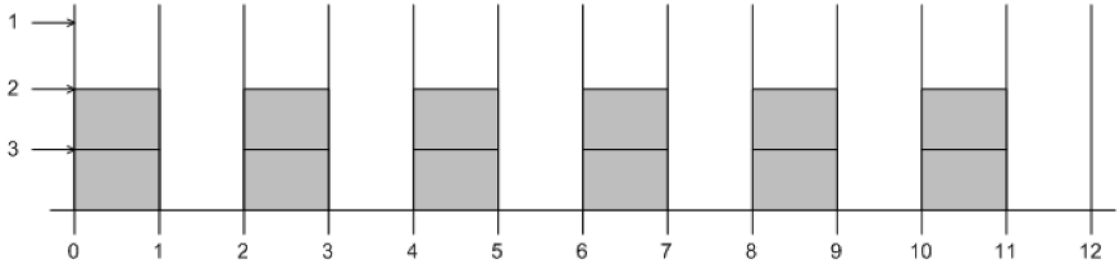
1 Frequency

2 1,000 Hz

3 500 Hz

Figure D.3 — BS 5839-1 Evacuate signal

D.3.5 BS 5839-1 Alert signal



Key

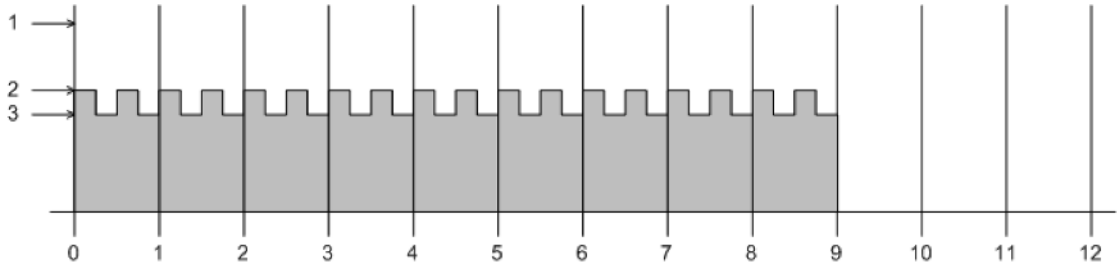
1 Frequency

2 1,000 Hz

3 500 Hz

Figure D.4 — BS 5839-1 Alert signal

D.3.6 NF S32-001 Evacuate signal



Key

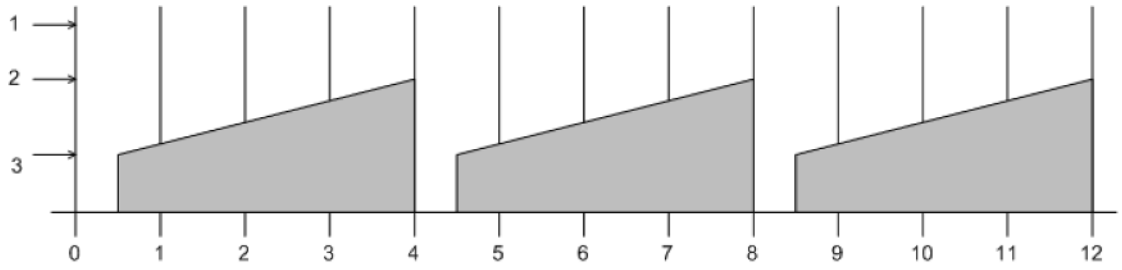
1 Frequency

2 554 Hz

3 440 Hz

Figure D.5 — NF S32-001 Evacuate signal

D.3.7 NEN 2575 Evacuate signal



Key

1 Frequency

2 1,200 Hz

3 500 Hz

Figure D.6 — NEN 2575 Evacuate signal

Annex E
(informative)

Comparison of flammability test requirements in various standards

E.1 Introduction

According to this European Standard, plastic materials should comply with the appropriate class of the relevant part of EN 60695 (see 4.2.3). Global manufacturers of plastic materials often provide certificate or test reports against the flammability requirements and tests methods specified in UL 94. This annex is intended to give comparative information between the test requirements and test methods for the flammability of plastics materials given in UL 94 and that given in the relevant part of IEC 60695.

ISO standards for flammability of plastic materials, ISO 1210 and ISO 10351 were specified in EN 54-3:2001. A comparison with these ISO standards has also been included in this annex for reference.

E.2 Relevant standards

The following standards are covered in this annex:

— EN 60695-11-10:2013, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods (*IEC 60695-11-10:2013*);*

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

— 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;*

— UL 94, Edition 5:1996 – *Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*.

NOTE 1 ISO 1210:1992 was withdrawn after the publication of IEC 60695–11–10 which was adopted as EN 60695–11–10 in 1999.

NOTE 2 ISO 10351:1992 was withdrawn after the publication of IEC 60695–11–20 which was adopted as EN 60695–11–20 in 1999.

The test apparatus, conditioning applied, number of specimens, specimens size and procedure for the horizontal and vertical tests are very similar between ISO 1210 and IEC 60695-11-10 (EN 60695-11-10). The horizontal burning test is identified as method A and the vertical burning test is identified as method B in both the ISO and IEC/EN standards.

The test method described in UL 94 is again similar to that of ISO 1210 such that the apparatus, conditioning applied and test procedure are similar. The number of specimens specified in UL 94 is less than that specified in ISO 1210.

E.3 Vertical burning tests

For the vertical burning test, the categories given in Table E.1 can be regarded as being similar.

Table E.1 — Equivalence of flammability categories between ISO 1210, EN 60695–10 and UL 94

ISO 1210	EN 60695–11–10	UL 94 categories
FV-0	V-0	V-0
FV-1	V-1	V-1
FV-2	V-2	V-2

E.4 Horizontal burning tests

E.4.1 ISO 1210, IEC 60695-11-10 and UL 94

The classification for the horizontal burning tests differs between ISO 1210, IEC 60695-10 and UL 94 making a direct comparison difficult. To assist in such a comparison, the performance criteria for each standard are given in Table E.2, Table E.3 and Table E.4.

Table E.2 — Horizontal flammability classification in ISO 1210:1992

FH-1	**FH-2**[a)]	**FH-3**[b)]	**FH-4**[c)]
No visible flame after the ignition source is removed from the specimens or if the combustion front does not pass the 25 mm mark.	Combustion front passes the 25 mm mark but does not pass the 100 mm mark.	Combustion front passes the 100 mm mark and the linear burning rate does not exceed 40 mm/min for specimens with a thickness between 3 mm and 13 mm or 75 mm/min for specimens with a thickness less than 3 mm.	Same as FH-3 except that the linear burning rate exceeds 40 mm/min.

a) The length of the burnt area shall be added to the category designation (for example FH-2–70 mm).

b) The burning rate shall be added to the category designation (for example FH-3–30 mm/min).

c) The burning rate shall be added to the category designation (for example FH-4–60 mm/min).

Table E.3 — Horizontal flammability classification in EN 60695–11–10

HB	HB40	HB75
The test specimens do not visibly burn with a flame after the ignition source is removed.	The test specimens do not visibly burn with a flame after the ignition source is removed.	If the flame front passes the 100 mm mark, the test specimens do not have a linear burning rate exceeding 75 mm/min.
If the test specimens continue to burn with a flame after removal of the ignition source, the flame is less than 100 mm.	If the test specimens continue to burn with a flame after removal of the ignition source, the flame is less than 100 mm.	
If the flame front exceeds 100 mm, the linear burning rate of the specimens is less than 40 mm/min for a thickness of 3,0 mm to 13,0 mm or less than 75 mm/min for a thickness of less than 3,0 mm.	If the flame front exceeds 100 mm, the linear burning rate of the specimens is less than 40 mm/min.	
If the linear burning rate does not exceed 40 mm/min for tests with 3,0 mm ± 0,2 mm thickness, the specimen is automatically accepted. down to a 1,5 mm minimum thickness.		

Table E.4 — Horizontal flammability classification in UL 94

HB
a) for specimens having a thickness of 3,0 mm to 13,0 mm, the burning rate shall not exceed 40 mm/min over a 75 mm span, or
b) for specimens having a thickness less than 3,0 mm, the burning rate shall not exceed 75 mm/min over a 75 mm span, or
c) the specimens cease to burn before the flame exceeds 100 mm.

E.4.2 ISO 10351, IEC 60695-11-20 and UL 94

For the horizontal burning test, the categories given in Table E.5 can be regarded as being similar.

Table E.5 — Equivalence of flammability categories between ISO 10351, EN 60695–11–20 and UL 94

ISO 10351	EN 60695–11–20	UL 94
LFV-0	5VA	94–5VA
LFV-1	5VB	94–5VB

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the mandate M/109 for fire alarm/detection, fixed firefighting, fire and smoke control and explosion suppression products given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of sounders intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses

Product: Type A or Type B Sounders **Intended use:** Fire detection and fire alarm systems installed in and around buildings			
Essential characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Operational reliability: Duration of operation Provision for external conductors Flammability of materials Enclosure protection Access Manufacturer's adjustment On-site adjustment of behaviour Software controlled sounders *(when provided)*	4.2.1 4.2.2 4.2.3 4.2.4 4.2.5 4.2.6 4.2.7 4.2.8		ratio (dB)+description description EN 60695 flammability rating EN 60529 IP rating description description description description
Performance parameters under fire condition: Sound pressure level Frequencies and sound patterns Synchronisation *(when provided)* Performance of voice sounders Voice sounders sequence timing	4.3.1 4.3.2 4.3.3 4.3.4 4.3.5		dB(A)+description description ΔT (s) ratio (dB) + description time (s) ratio (dB) description + time (s)

Durability of performance parameters under	4.4.1.1	None	ratio (dB)+description
fire conditions:	4.4.1.2		ratio (dB)+description
Temperature resistance:	4.4.1.3		ratio (dB)+description
Dry heat (operational)			
Dry heat (endurance)	4.4.2.1		ratio (dB)+description
Cold (operational)	4.4.2.2		ratio (dB)+description
Humidity resistance:	4.4.2.3		ratio (dB)+description
Damp heat, cyclic (operational)			
Damp heat, steady-state (endurance)	4.4.3.1		ratio (dB)+description
Damp heat, cyclic (endurance):	4.4.3.2		ratio (dB)+description
Shock and vibration resistance:	4.4.3.3		ratio (dB)+description
Shock (operational)	4.4.3.4		ratio (dB)+description
Impact (operational)			
Vibration (operational)	4.4.4.1		ratio (dB)+description
Vibration (endurance)			
Corrosion resistance:	4.4.5.1		ratio (dB)+description
SO_2 corrosion (endurance)			
Electrical stability:			
EMC, immunity (operational)			

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for assessment and verification of constancy of performance (AVCP) of sounders

ZA.2.1 System of AVCP

The AVCP system(s) of sounders indicated in Table ZA.1 established by EC Decision 1996/577/EC (OJEU L254 of 1996-10-08), as amended by EC Decision 2002/592/EC (OJEU L192 of 2002-07-20) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — Attestation of conformity system

Product	Intended use	Level(s) or class(es) of performance	AVCP system
Fire detection/fire alarm: Alarm devices	Fire safety	-	1
System 1: See Regulation (EU) No 305/2011 (CPR) Annex V.1.2			

The AVCP of the sounder in Table ZA.1 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of evaluation of conformity tasks for sounders under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.3.5
Tasks for the product certification body	Determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Essential characteristic of Table ZA.1 relevant for the intended use	6.3
	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use, which are declared, Documentation of FPC	6.3
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use, which are declared,. Documentation of FPC	6.3

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer shall draw up the DoP and affixes the CE marking on the basis of AVCP system set out in Annex V of the Regulation (EU) No 305/2011:

— the factory production control and further testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of constancy of performance issued by the notified product certification body on the basis of determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011. According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for sounders:

DECLARATION OF PERFORMANCE
No. 001CPR2013-07-14

1. Unique identification code of the product-type:

Type A 24 V DC 90 dBA fire alarm sounder: T90-A-Vx-SDR1X-0024

2. Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

Type A 24 V DC 90 dBA fire alarm sounder: T90-A-Vx-SDR1X-0024

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Fire detection and fire alarm systems in and around buildings

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5), e.g.:

AnyCo Ltd,

PO Box 210

EC1-0XX - United Kingdom

Tel. +44207123456

Fax: +44207123457

Email: sales@anyco.co.uk

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2), e.g.:

Anyone SA

PO Box 01

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

E-mail: anyone@provider.be

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR,

Annex V:

System 1

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

The product certification body No1234 performed the determination of the product type under system 1 on the basis of the type testing, the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control, and issued the certificate of constancy of performance.

8. Declared performance;

Essential characteristics	Performance	Harmonized technical specification
Operational reliability: Duration of operation Provision for external conductors Flammability of materials Enclosure protection Access Manufacturer's adjustment On-site adjustment of behaviour Software controlled sounders (when provided)	$\Delta(L_{pA}) \leq 6$ dB Space in enclosure, entry holes and conductor clamping provided Class V-2 / HB75 / 5VB IP21C (Type A) / IP33C (Type B), $\Delta(L_{pA}) \leq 6$ dB, no water ingress / adequate drainage No access to remove parts or make adjustments Special means required Special means required, settings clearly marked Documentation available, modular structure, invalid data not permitted, program deadlock avoided. site specific data in non-volatile memory with two-week retention	EN 54–3:2014
Performance parameters under fire condition: Sound pressure level Frequencies and sound patterns Synchronisation (when provided) Performance of voice sounders Voice sounders sequence timing	$L_{pA} \geq 65$ dB(A) $L_{pA} \geq$ declared value at all measured angles Correct as declared by the manufacturer $\Delta T < 0{,}05$ s $L_{Aeq,T} \leq 10$ dB below $L_{AFmax,T}$ at 15° and 90° angles Attention drawing signal: 2 s to 10 s / Voice message: ≤ 30 s / Silence periods: 0,25 s to 2 s	
Durability of performance parameters under fire conditions: Temperature resistance: Dry heat (operational) Dry heat (endurance) Cold (operational) Humidity resistance: Damp heat, cyclic (operational) Damp heat, steady-state (endurance) Damp heat, cyclic (endurance) Shock and vibration resistance: Shock (operational) Impact (operational) Vibration (operational) Vibration (endurance) Corrosion resistance:	No false operations, $\Delta(L_{pA}) \leq 6$ dB Δ(LpA) ≤ 6 dB No false operations, $\Delta(L_{pA}) \leq 6$ dB No false operations, $\Delta(L_{pA}) \leq 6$ dB $\Delta(L_{pA}) \leq 6$ dB $\Delta(L_{pA}) \leq 6$ dB $\Delta(L_{pA}) \leq 6$ dB No false operations, $\Delta(L_{pA}) \leq 6$ dB No false operations, $\Delta(L_{pA}) \leq 6$ dB $\Delta(L_{pA}) \leq 6$ dB $\Delta(L_{pA}) \leq 6$ dB no false operations, $\Delta(L_{pA}) \leq 6$ dB	

SO2 corrosion (endurance) Electrical stability: EMC, immunity (operational)		

9 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. . This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

.....

(name and function)

....

(place, date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly together with the identification number of the certification body and the number of the DoP to the sounder.

The CE marking symbol shall also be placed in the documents accompanying the sounder and it shall be followed by:

a) the last two digits of the year in which it was first affixed;

b) the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

c) the unique identification code of the product- type;

d) the reference number of the declaration of performance;

e) the level or class of the performance declared;

f) the dated reference to the harmonized technical specification applied, EN 54-3:2014;

g) the identification number of the notified body;

h) the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 gives an example of the information to be placed on the sounders subject to AVPC under system 1.

Figure ZA.2 gives an example of the information related to be placed in the commercial documents accompanying the sounders.

CE marking, consisting of the "CE"-symbol given in Directive 93/68/EEC

Identification number of the product certification body
Reference number of the DoP

Figure ZA.1 — Example of CE marking information to be affixed on the sounders

CE 1234	*CE marking, consisting of the "CE"-symbol given in Directive 93/68/EEC* *Identification number of the product certification body*
AnyCo Ltd, PO Box 21, B-1050 **14** [001CPR2013–07–14]	*Name or identifying mark and registered address of the producer or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 54–3 *Type A 24 V DC 90 dBA fire alarm sounder - T90-A-Vx-SDR1X-0024* Intended for use in fire detection and fire alarm systems in and around buildings Duration of operation: $\Delta(L_{pA}) \leq 6$ dB Provision for external conductors: space in enclosure, entry holes and conductor clamping provided Flammability of materials: class V-2 Enclosure protection: IP21C (Type A),), $\Delta(L_{pA}) \leq 6$ dB, adequate drainage Access: no access to remove parts or make adjustments Manufacturer's adjustment: special means required On-site adjustment of behaviour: special means required, settings clearly marked Software controlled sounders*:* documentation available, modular structure, invalid data not permitted, program deadlock avoided, site specific data in non-volatile memory with two-week retention Sound pressure level: $L_{pA} \geq 65$ dB(A), $L_{pA} \geq$ declared value at all measured angles Frequencies and sound patterns: as declared by the manufacturer Synchronisation*:* $\Delta T < 0{,}05$ s Performance of voice sounders: $L_{Aeq,T} \leq 10$ dB below $L_{AFmax,T}$ at 15° and 90° angles Voice sounders sequence timing: attention drawing signal: 2 s to 10 s, voice message ≤ 30 s, silence periods: 0,25 s to 2 s **Durability of performance parameters under fire conditions:** Dry heat (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Cold (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Damp heat, cyclic (operational): No false operations, $\Delta(L_{pA}) \leq 6$ dB Damp heat, steady-state (endurance): $\Delta(L_{pA}) \leq 6$ dB Shock (operational): $\Delta(L_{pA}) \leq 6$ dB Impact (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Vibration (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Vibration (endurance): no false operations, $\Delta(L_{pA}) \leq 6$ dB Corrosion resistance (SO2): $\Delta(L_{pA}) \leq 6$ dB Electrical stability (EMC immunity): no false operations, $\Delta(L_{pA}) \leq 6$ dB	*No. of European Standard as referenced in the OJEU* *Unique identification code of the product-type as given by the manufacturer* *Intended use as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.2 — Example of CE marking information in the documentation accompanying a Type A voice sounders

CE 1234	*CE marking, consisting of the "CE"-symbol given in Directive 93/68/EEC* *Identification number of the product certification body*
AnyCo Ltd, PO Box 21, B-1050 **13** 002CPR2013–07–14	*Name or identifying mark and registered address of the producer or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 54–3 *Type B 24 V DC 110 dBA fire alarm sounder – T110-B-Vx-SDR2X-04* Intended for use in fire detection and fire alarm systems in and around buildings Duration of operation: $\Delta(L_{pA}) \leq 6$ dB Provision for external conductors: space in enclosure, entry holes and conductor clamping provided Flammability of materials: class 5VB Enclosure protection: IP33C (Type B)), $\Delta(L_{pA} \leq 6$ dB, no water ingress Access: no access to remove parts or make adjustments Manufacturer's adjustment: special means required On-site adjustment of behaviour: no site adjustment of behaviour provided Sound pressure level: $L_{pA} \geq 65$ dB(A), $L_{pA} \geq$ declared value at all measured angles Frequencies and sound patterns: as declared by the manufacturer **Durability of performance parameters under fire conditions:** Dry heat (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Dry heat (endurance): Δ(LpA) ≤ 6 dB Cold (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Damp heat, cyclic (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Damp heat, steady-state (endurance): $\Delta(L_{pA}) \leq 6$ dB Damp heat, cyclic (endurance): $\Delta(L_{pA}) \leq 6$ dB Shock (operational): $\Delta(L_{pA}) \leq 6$ dB Impact (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Vibration (operational): no false operations, $\Delta(L_{pA}) \leq 6$ dB Vibration (endurance): no false operations, $\Delta(L_{pA}) \leq 6$ dB Corrosion resistance (SO2): $\Delta(L_{pA}) \leq 6$ dB Electrical stability (EMC immunity): sounder do not rely on active components	*No. of European Standard as referenced in the OJEU* *Unique identification code of the product-type as given by the manufacturer* *Intended use as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.3 — Example of CE marking information in the documentation accompanying a Type B sounder (not software controlled and not using active electronic components)

Bibliography

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

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