BS 10999:2010

BSI Standards Publication

Specification for distress signal units for the Fire and Rescue Service

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ISBN 978 0 580 65704 7

ICS 13.340.10, 13.340.30

The following BSI references relate to the work on this standard:
Committee reference PH/4
Draft for comment 09/30194709 DC

Publication history
First published March 2010

Amendments issued since publication

Date	Text affected

Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 8, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 31 March 2010. It was prepared by Technical Committee PH/4, *Respiratory protection*. A list of organizations represented on this committee can be obtained on request to its secretary.

Information about this document

This standard has been produced to update and supersede the Department for Communities and Local Government Specification JCDD/38 for automatic distress signal units [1].

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in notes in smaller italic type, and does not constitute a normative element.

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

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

In particular, attention is drawn to the following legislation.

ATEX Directive [2]

EMC Directive [3]

PPE Directive [4]

The Noise at Work Regulations 1989 [5], as amended

The Waste Electrical and Electronic Equipment Regulations 2006 [6], as amended

1 Scope

This British Standard specifies minimum requirements for the performance and testing of distress signal units (DSUs) that emit at least an audible signal:

a) to summon aid in the event the user becomes incapacitated or needs assistance, or for signalling evacuation, for use by Fire and Rescue Service (FRS) personnel; and

b) that is activated automatically on immobility of the wearer of the DSU and manually operated separately by the wearer.

This standard is intended for DSUs used by the FRS and is applicable to both stand-alone DSUs and those integrated into self-contained breathing apparatus (SCBA).

NOTE A number of the requirements specified in this British Standard involve subjecting DSUs to tests. It is assumed that, where relevant, these tests are carried out with the DSUs in the condition in which they are intended to be used, e.g. with or without their keys.

2 Normative references

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

BS EN 137:2006, *Respiratory protective devices – Self-contained open-circuit compressed air breathing apparatus with full face mask – Requirements, testing, marking*

BS EN 60079-11, *Explosive atmospheres – Equipment protection by intrinsic safety "i"*

BS EN 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

BS EN 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

NFPA 1982:2007, *Standard on Personal Alert Safety Systems (PASS)*

3 Terms and definitions

For the purposes of this British Standard the following terms and definitions apply.

3.1 distress signal unit (DSU)

3.1.1 integrated
device with dispersed components incorporated into the construction or assembly of SCBA

3.1.2 stand-alone
self-contained, independent device contained in a single case, housing or enclosure that is not an integral part(s) of protective clothing or equipment, but includes a means of attachment

3.2 key
device that renders the DSU ready for use or silences it

EXAMPLES
Removable key, swipe card, smart card and electronic signal.

4 General

4.1 The construction of a stand-alone DSU shall be such that it is robust and capable of withstanding general rough usage. The casing shall be of such a shape as to reduce the likelihood of inadvertent snagging when the wearer is negotiating areas with restricted access and to facilitate its attachment and positioning on the breathing apparatus.

4.2 The DSU shall be compact and suitable for attaching to breathing apparatus in a readily accessible position. It may also be designed to be suitable for attaching to non breathing apparatus wearers.

4.3 The DSU shall operate at the temperature range specified for SCBA in BS EN 137:2006, **6.11.1**.

4.4 The DSU shall be capable of continuously sounding the full alarm sound pressure level for a minimum of 2 h from the point at which the low battery warning (see Clause **7**) activates.

5 Materials

5.1 All materials used in the construction of the DSU shall be recyclable so far as is practicable.

NOTE Attention is drawn to the Waste Electrical and Electronic Equipment Regulations 2006 [6].

5.2 Exposed parts of a stand-alone DSU, i.e. those that could be subjected to impact during use, shall not comprise aluminium, magnesium, or titanium, or alloys of these.

5.3 A stand-alone DSU shall be made of materials which are not known to be likely to cause irritation or any other adverse effect to health.

6 Priming and operation

6.1 Key

The DSU shall have a key to render it ready for use and to silence it. It shall not be possible to remove the key without priming the DSU for subsequent use, which shall be confirmed by an audible or visual signal.

6.2 Actuation

The DSU shall be designed and constructed such that:

a) it does not sound whilst the wearer is moving, unless manually operated;

b) if the wearer remains immobile for between 20 s and 30 s it activates initially in a pre-alarm mode at a lower sound pressure level than the full alarm signal.

The pre-alarm (see **6.3.1**) shall be between 5 s and 15 s in duration and thereafter, unless the pre-alarm signal is cancelled by movement of the DSU, it shall operate at the full alarm sound pressure level (see **6.3.2**).

A means of manual activation, for example, a push button, shall be provided in a readily accessible position to enable the wearer to operate the DSU manually at the full alarm sound pressure level.

The means of manual activation shall be designed to prevent accidental operation, and the force required to activate it shall be between 10 N and 20 N. The means of manual activation shall be such that it can be operated by a finger in a typical firefighting glove, e.g. a glove conforming to BS EN 659 or NFPA 1971.

The DSU shall operate in full alarm mode immediately it is activated.

The DSU shall not be able to be silenced after either automatic or manual operation in the full alarm mode except by the use of the key.

6.3 Sound emitting device

6.3.1 Pre-alarm signal

The pre-alarm signal shall have a different sound pattern to that of the full alarm signal specified in **6.3.2**.

The sound level of the pre-alarm signal, measured in accordance with the procedure given in Annex A, shall be between 84 L_{Aeq}(6s)dB(A) and 102 L_{Aeq}(6s)dB(A) at an upper frequency of (2 900 $\pm$200) Hz and be at least 6 dBA below that of the full alarm signal.

6.3.2 Full alarm signal

6.3.2.1 The sound level of the full alarm signal, measured in accordance with Annex A, shall be between 102 L_{Aeq}(30s)dB(A) and 112 L_{Aeq}(30s)dB(A).

The full alarm signal shall as a minimum include the following sound pattern.

a) From a stabilized upper frequency of (2 900 $\pm$200) Hz the frequency of the sound emitted shall decrease sharply by not less than 600 Hz and then recover to the stabilized upper frequency.

b) The duration of this event shall be between 10 ms and 20 ms, during which time the frequency shall have recovered to within 100 Hz of the initial stabilized upper frequency. This event shall occur at a rate of 4 cycles/s.

NOTE Where a telemetry system interfaces with the DSU a gap of not greater than 400 ms between each consecutive group of 4 cycles should be permitted.

6.3.2.2 Any additional sound pattern(s) shall not mask or otherwise detract from the distinctive and recognizable sound pattern specified in **6.3.2.1**.

Where a reduced volume alarm is provided for training purposes, etc., this shall not affect conformity with **6.3.2.1**.

6.4 Prevention of muffling of sound emission

The DSU shall be designed so as to reduce, as far as practicable, the sound emission being muffled when the unit is pressed against a flat or yielding surface.

NOTE One method of reducing muffling is to make the DSU bulb-shaped so that it is less likely to be muffled when pressed against a flat or yielding surface.

7 Low battery warning

The DSU shall incorporate an audible (if stand-alone) or audible and visual (if integrated) low battery warning facility utilizing a different noise characteristic to that of both the pre-alarm and full alarm signals, and where integrated, to other warnings utilized in the breathing apparatus or device.

8 Function indicator

The DSU shall incorporate a light-emitting device which shall operate while the DSU is in use to indicate that the unit remains operational.

9 Intrinsic safety and electromagnetic compatibility

When tested in accordance with BS EN 60079-11, the DSU shall have an intrinsic safety level of EEx ia IIC T4 in an ambient operating temperature range of –30 °C to 60 °C.

When tested in accordance with BS EN 61000-6-2, the DSU shall continue to operate as intended during and after the test.

10 Mass

A stand-alone DSU shall be as light as possible, but not exceed 400 g when complete and ready for use, i.e. incorporating the battery.

NOTE This requirement relates to a DSU that includes any components for additional features which fall outside the scope of this specification, but excluding the mass of any connections between the DSU and the breathing apparatus associated with such additional features. The mass of SCBA into which any DSU is integrated is specified in BS EN 137.

11 Resistance to temperature and flammability

11.1 Performance at high and low temperature

When subjected to the following temperatures for (4 h ±15 min):

a) (–30 ±3) °C;

b) (60 ±3) °C,

and tested within 3 min, the DSU shall continue to operate in accordance with the requirements of **4.4** and Clause **6**.

11.2 Flame engulfment

When tested in accordance with BS EN 137:2006, **7.4.1.3**, a DSU shall operate continuously as intended during the flame engulfment test and, after testing, shall meet the minimum requirements of **6.3.2** and remain attached to any breathing apparatus.

12 Watertightness

When tested in accordance with NFPA 1982:2007, **8.5**, the DSU shall operate continuously in accordance with the requirements of Clause **4** and Clause **6** and shall have no moisture in its battery compartment(s).

13 Resistance to impact

When subjected to six successive drops in a random manner from a height of 2 m onto a concrete surface, a stand-alone DSU shall operate in accordance with Clause **4** and Clause **6**. When separately drop-tested whilst already in full alarm mode, the DSU shall continue to operate in accordance with Clause **4** and Clause **6** during and for at least another 5 min on conclusion of the test.

14 Marking

A stand-alone DSU shall be permanently marked with the following information:

a) the name, trade mark, code or other means of identification of the producer, supplier or importer;

b) the number and date of this British Standard, i.e. BS 10999:2010 [1)];

c) a serial number;

d) year of manufacture;

e) intrinsic safety classification (see Clause **9**); and

f) the type of batteries to be used.

NOTE For an integrated DSU, this information can be marked elsewhere on the SCBA.

15 Information supplied by manufacturer

A stand-alone or integrated DSU shall be supplied with at least the following information in the official language(s) of the country of destination:

a) application/limitation;

b) checks prior to use;

c) donning and fitting;

d) use;

e) maintenance (preferably in separate printed instructions, containing references to any relevant standards and including periodic inspection and testing);

f) storage;

g) the availability of spare parts; and

h) the type of batteries to be used.

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1) Marking BS 10999:2010 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Annex A (normative) Test for sound level

A.1 Apparatus

A.1.1 *A reverberant field*, i.e. indoors, where the floor to ceiling height and the distance to any potentially reflective surface or object, other than the floor and the support, is not less than 2.5 m from both the microphone of the sound level meter and the DSU under test (an example test chamber is shown in Figure A.1).

A.1.2 *An integrating-averaging sound level meter, or equivalent system*, conforming to Type 2 or better of BS EN 61672-1.

A.2 Procedure

A.2.1 Ambient noise levels at the microphone position, measured over a period of at least 1 min immediately prior to and immediately after the test programme, shall be at least 15L Leq A dBA below the lowest of those expected to be measured during the tests.

A.2.2 Firmly mount the DSU on a support with a diameter of between 25 mm and 40 mm, with the centre of the DSU's sounder at a height of between 1.2 m and 1.5 m ($\pm$ 20 mm) above the floor and (250 $\pm$ 25) mm and directly facing the microphone of the sound level meter mounted at the same height ($\pm$ 25 mm). Measure the horizontal distance from the front of the DSU, at the position of the sounder, to the microphone without its windshield. The sound level meter shall be fitted with a manufacturer's approved windshield.

A.2.3 Check the sound level meter for battery condition and calibrate according to the manufacturer's instructions, immediately prior to and after the completion of each test, and record this.

A.2.4 Set the sound level meter to L_{Aeq}-weighting, F response and a range appropriate to the maximum sound levels expected.

Measure the pre-alarm signal for (6 $\pm$1) s before the full alarm signal activates.

NOTE It is important that the measurements do not include any part of the full alarm signal.

A.2.5 Measurements for the full alarm signal shall be made over a time period of (30 $\pm$ 2) s.

A.2.6 Record measurements, rounding these to the nearest 1.0 dBA, with 0.5 being rounded up.

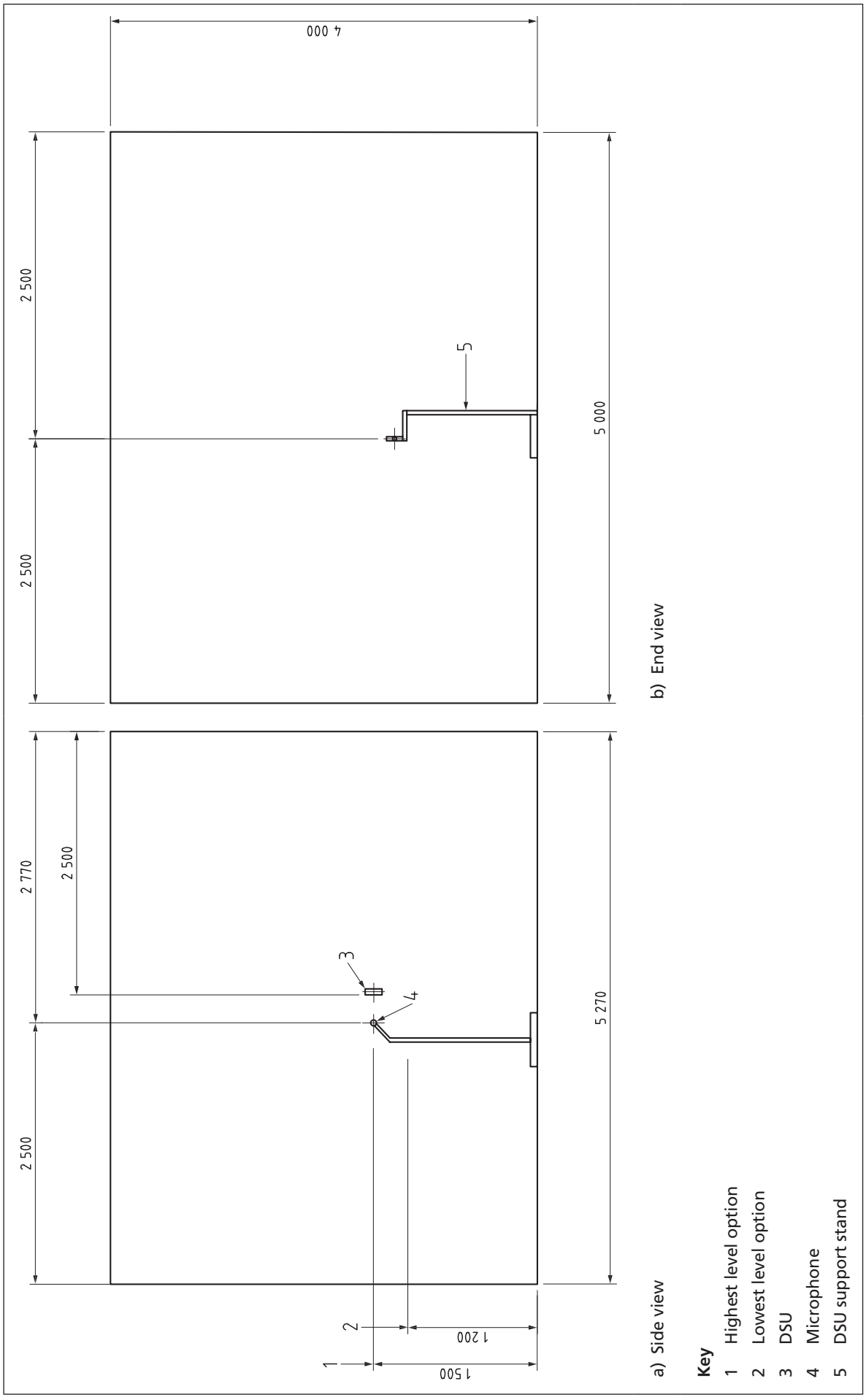

Figure A.1 **Example test chamber**

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 5438, *Methods of test for flammability of textile fabrics when subjected to a small igniting flame applied to the face or bottom edge of vertically oriented specimens*

BS EN 136, *Respiratory protective devices – Full face masks – Requirements, testing, marking*

BS EN 659, *Protective gloves for firefighters*

BS EN 50020, *Electrical apparatus for potentially explosive atmospheres – Intrinsic safety 'i'*

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting*

Other publications

[1] DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT. Specification JCDD/38 for automatic distress signal units.

[2] EUROPEAN COMMUNITY. Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (OJ L 100, 19.4.1994, p. 1–29). Brussels.

[3] EUROPEAN COMMUNITY. Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC Text with EEA relevance (OJ L 390, 31.12.2004, p. 24–37). Brussels.

[4] EUROPEAN COMMUNITY. Directive 96/58/EC of the European Parliament and the Council of 3 September 1996 amending Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment (OJ L 236, 18.9.1996, p. 44–44). Brussels.

[5] GREAT BRITAIN. The Noise at Work Regulations 1989, SI 1790, as amended, London: The Stationery Office.

[6] GREAT BRITAIN. The Waste Electrical and Electronic Equipment Regulations 2006, SI 3289, as amended, London: The Stationery Office.

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