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Ships and marine technology — Pyrotechnic life-saving appliances — Testing, inspection and marking of production units

Navires et technologie maritime — Appareils pyrotechniques de sauvetage — Essais, contrôle et marquage des unités de production

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 15736 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 1, *Lifesaving and fire protection*.

Introduction

This International Standard is intended for use in conjunction with the International Maritime Organization's (IMO) *Life-Saving Appliance (LSA) Code* and related IMO instruments to assess the conformity of production pyrotechnic life-saving appliances with IMO requirements. Some of the provisions of this standard exceed IMO requirements in that the IMO *Recommendation on testing of life-saving appliances* (IMO Resolution A.689(17), as amended through Resolution MSC.81(70)) does not specifically address sampling, testing, inspection, and marking of production units of pyrotechnic life-saving appliances. It is believed to accurately reflect current best practices among manufacturers of approved pyrotechnic life-saving appliances.

Ships and marine technology — Pyrotechnic life-saving appliances — Testing, inspection and marking of production units

1 Scope

This International Standard specifies production tests, inspections, conformity assessment procedures and marking requirements for life-saving appliances that utilize pyrotechnic devices in functioning. Specifically, it applies to products which have been evaluated and tested in accordance with the International Maritime Organization (IMO) *Recommendation on testing of life-saving appliances*, and type approved by maritime administrations to the requirements of the IMO *Life-Saving Appliance (LSA) Code* for use on ships subject to the requirements of the 1974 Safety of Life at Sea Convention (as amended). The basic principles may be considered suitable for pyrotechnic life-saving appliances manufactured to other than the IMO requirements, however this International Standard applies directly only to products for which it contains specific requirements.

This International Standard does not affect the requirement in part 2, section 4 of the IMO *Recommendation on testing of life-saving appliances* to periodically repeat full prototype testing of pyrotechnic life-saving appliances. However, compliance with this International Standard may be taken into account by administrations in prescribing the frequency of such tests.

2 Normative reference(s)

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.

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ASTM D 1535-97, *Standard Practice for Specifying Colour by the Munsell System*

IMO, *Life-Saving Appliance (LSA) Code*

IMO, *Recommendation on testing of life-saving appliances (Res. A.689(17), as amended through Res. MSC.81(70)*

United Nations Recommendations on the Transport of Dangerous Goods

3 Term(s) and definition(s)

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

3.1
ambient temperature
unregulated outdoor temperature

3.2
batch
unit of production of pyrotechnic chemical composition, manufactured under the same conditions, of the same raw materials, at substantially the same time

3.3
burn time
emission time
period of time measured from when a distinct sustained flame (or smoke for smoke signals) is emitted until it ceases

3.4
lot
unit of production which, as far as is practicable, consists of items of a single type, class, size and type of composition, manufactured under substantially the same conditions, and at substantially the same time

4 General requirements

4.1 Manufacturing standards

Manufacturers shall have in place a manufacturing quality control system sufficient to ensure that series production items are manufactured according to substantially the same production methods, from the same materials and according to the same quality standards as the prototype samples tested for approval by a maritime administration, and are suitable for the purpose for which they are intended.

NOTE 1 This clause is not intended to inhibit refinements of manufacturing processes that do not adversely affect the end product.

NOTE 2 Compliance with a quality management system such as the ISO 9000 series is recommended.

4.1.1 Recommended production testing and inspection procedures constituting an effective manufacturing quality control system are contained in Annex A. The procedures in Annex A are intended to address the requirement in Part 2 of the IMO *Recommendation on testing of life-saving appliances* for statistically adequate sampling of production lots. (The term "lot" as used in this International Standard has the same meaning as "batch" as used in Part 2 of the IMO *Recommendation on testing of life-saving appliances*.)

4.2 Visual appearance and craftsmanship

Pyrotechnic life-saving appliances shall be free from imperfections of manufacture affecting their appearance or that may affect their serviceability.

4.3 Markings

Each production item produced in accordance with the procedures in this International Standard shall be clearly and indelibly marked by the manufacturer with the following information:

a) Item type or model identification;

b) Relevant functional information (altitude, burn time, candela rating, and others as appropriate);

c) "SOLAS 96" or "IMO LSA Code";

d) "ISO 15736";

e) Name of manufacturer;

f) Month and year of manufacture; and

g) Approval information (as specified by the approving maritime administration(s)).

4.3.1 Marking of date of expiry

4.3.1.1 In addition to the markings specified above, pyrotechnic life-saving appliances shall be permanently marked with the date of expiry.

4.3.1.2 The date of expiry for pyrotechnic lifesaving appliances shall be 36 months from the date of manufacture, except in cases where a maritime administration has approved a longer service life based upon documented operational experience.

4.3.2 Marking of transportation packaging

The marking of the packaging for transport shall be in accordance with the *United Nations Recommendations on the Transport of Dangerous Goods*.

4.4 Documentation

4.4.1 Complete product documentation, including prototype test records, shall be retained as long as the product is in production and for at least three years after the date of expiry of the last production lot.

4.4.2 Complete lot production documentation including production test records shall be kept on file for at least three years after the date of expiry of the production lot.

5 Performance requirements

5.1 Rocket parachute flare

5.1.1 Altitude of expulsion

The rocket shall, when fired vertically, at or near the peak of its trajectory eject a parachute flare at an altitude of not less than 300 m. The altitude shall be determined by triangulation from two or more points of observation, as specified in 6.3.1.

Alternative methods of establishing the expulsion altitude may be acceptable if approved by the administration as providing equivalent results.

5.1.2 Colour of burning illuminant

The flare shall burn with a vivid red colour, with Commission International de l'Eclairage (CIE) coordinates $x = 0{,}61$ to $0{,}69$ and $y = 0{,}3$ to $0{,}39$, or computed from these coordinates, a wavelength of 608 nanometres (nm) $\pm$ 11 nm, when tested as specified in 6.1.

5.1.3 Luminous intensity

The flare shall exhibit an average luminous intensity of not less than 30 000 candela (cd) over the complete flare burn time when tested as specified in 6.1.

5.1.4 Flare burn time

The flare shall sustain burning for a period of at least 40 s.

5.1.5 Flare descent rate

The flare shall have an average rate of descent of not more than 5 m/s, determined as specified in 6.3.2.

5.1.6 Resistance to parachute damage

The functions of expulsion, deployment, and flare burning shall not damage the parachute, or its attachments, such as results in a descent rate greater than specified.

5.2 Hand flare

5.2.1 Colour of burning illuminant

The flare shall burn with a vivid red colour, with CIE coordinates $x = 0{,}61$ to $0{,}69$ and $y = 0{,}3$ to $0{,}39$, or computed from these coordinates, a wavelength of 608 nm ± 11 nm, when tested as specified in 6.1.

5.2.2 Luminous intensity

The flare shall exhibit an average luminous intensity of not less than 15 000 cd over the complete flare burn time when tested as specified in 6.1.

5.2.3 Flare burn time

The flare shall burn for a period of not less than 1 min when tested as specified in 6.10.

5.2.4 Delay time

If the flare is designed to be operated from the burning end, it shall incorporate an operational safety delay of 3,0 s ± 1,0 s.

5.3 Buoyant smoke signal

5.3.1 Smoke colour

Each signal shall emit smoke of a highly visible orange colour when tested as specified in 6.9.

5.3.2 Smoke density

Each signal shall emit smoke such that at least 70 % obscuration is attained throughout the required emission time when tested as specified in 6.8.

5.3.3 Emission time

Each signal shall emit smoke at a uniform rate for not less than 3 min when floating in calm water, when tested as specified in 6.10.

5.3.4 Flameless generator

The signal shall not emit any flame during the entire smoke emission time.

5.4 Lifebuoy self-activating smoke signal

5.4.1 Smoke colour

Each signal shall emit smoke of a highly visible orange colour when tested as specified in 6.9.

5.4.2 Smoke density

Each signal shall emit smoke such that at least 70 % obscuration is attained throughout the required emission time when tested as specified in 6.8.

5.4.3 Emission time

Each signal shall emit smoke at a uniform rate for not less than 15 min when floating in calm water when tested as specified in 6.10.

5.4.4 Flameless generator

The signal shall not emit any flame during the entire smoke emission time.

5.5 Line-throwing appliances

5.5.1 Accuracy

Lateral deflection from line of firing shall not exceed 10 % of the length of flight of the projectile when tested in accordance with 6.11.

5.5.2 Distance

Each rocket shall carry the line at least 230 m in calm conditions when tested in accordance with 6.11. During firing a maximum wind speed of 4 m/s from any direction is allowed.

5.5.3 Line load capacity

The line shall have a breaking strength of not less than 2 kN when tested in the wet condition with a knot in the centre of the line length.

6 Test procedures

6.1 Luminous intensity measurement

6.1.1 Laboratory testing of the flare material shall establish that it will burn uniformly with the required average luminous intensity and that the colour of the flame is a vivid red.

6.1.2 Measurement of the luminous intensity requires the use of a visual photometer or equivalent photometric device. The specimen shall be supported in position 45° from vertical with the burning end uppermost (hand flare) or with the burning end down (flare of the hand held rocket) with the photometer perpendicular to the axis of the flare. The minimum photometric distance shall be 7 m.

6.1.3 Recording photometers shall have a chart speed of at least 100 mm/min. Computerized recording shall be done with a sampling rate of at least 100 milliseconds.

6.2 Thrust versus time measurement

Laboratory testing of the rocket motor shall establish that the rocket motor is within the manufacturer's defined tolerances, as defined at the type approval tests.

The thrust measurement shall be done with a calibrated strain gauge or piezo type of load cell. As a minimum requirement the peak thrust, the thrust impulse and burn time shall be recorded.