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Ships and marine technology — Night vision equipment for high-speed craft — Operational and performance requirements, methods of testing and required test results

Navires et technologie maritime — Équipement de vision nocturne pour navires à grande vitesse — Exigences opérationnelles et de performance, méthodes d'essai et résultats d'essai exigés

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation and ship operations*.

This second edition cancels and replaces the first edition (ISO 16273:2003), which has been technically revised.

The main changes compared to the previous edition are as follows:

— definitions 3.5 "performance check", 3.6 "performance check (EMC)", 3.7 "performance test" 3.8 "single operator action", 3.9 "field of view" and 3.10 "instantaneous field of view" have been added;

— 4.8 "Stabilisation of the field of view against the motions of the vessel" has been added;

— 4.10 "Clear view", former 4.11, has been clarified;

— 4.13 "Line of sight" has been added;

— 4.15 "Presentation of information", former 4.16, has been modified;

— 4.22 "Interfacing" has been modified;

— 5.1.2 "Performance test" has been added;

— 5.1.3 "Performance check", former 6.3, has been modified;

— 5.1.4 "Performance check (EMC)" has been added;

— 5.2.3 "Roll and pitch test", former 6.2.2, has been modified;

— 5.4.2.8 "Wind endurance test" has been added;

— 5.4.3 "Test of thermal imaging systems", former 7.2, has been modified;

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— 5.4.3.2, Table 2 "Atmospheric extinction coefficients for different wavelength ranges" values have been adjusted;

— 5.4.4 "Test of active image-intensifier systems", former 7.3, has been modified and testing of non-visible illumination has been added;

— 5.5 "Sea trials", former Clause 8, has been modified, the surface of test specimen has been specified;

— Annex D (normative) "Measurement of MTDP (minimum temperature difference perceived) of thermal imagers" has been added;

— Annex E (normative) "Stabilisation test for thermal imaging systems" has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html..

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Introduction

This document has been developed to support the implementation of the International Code of Safety for High-Speed Craft (HSC code), Chapter 13, of the International Maritime Organisation (IMO), and the IMO performance standards for night vision equipment for high-speed craft in the IMO Resolution MSC.94 (72)

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Ships and marine technology — Night vision equipment for high-speed craft — Operational and performance requirements, methods of testing and required test results

1 Scope

This document specifies operational and performance requirements and methods of testing for night vision equipment fitted to high-speed craft.

NOTE In this document, the text identical to IMO Resolution MSC.94 (72) is printed in italics; references to the paragraphs concerned in the IMO Resolution are given in brackets.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 9335, *Optics and photonics — Optical transfer function — Principles and procedures of measurement*

ISO 15529, *Optics and photonics — Optical transfer function — Principles of measurement of modulation transfer function (MTF) of sampled imaging systems*

IEC 60945, *Maritime navigation and radiocommunication equipment and systems — General requirements — Methods of testing and required test results*

IEC 61162, *Maritime navigation and radiocommunication equipment and systems — Digital Interfaces*

IEC 62288:2014, *Maritime navigation and radiocommunication equipment and systems — Presentation of navigation-related information on shipborne navigational displays — General requirements, methods of testing and required test results*

IEC 62388:2013, *Maritime navigation and radiocommunication equipment and systems — Shipborne radar — Performance requirements, methods of testing and required test results*

IEC 62923, *Maritime navigation and radiocommunication equipment and systems — Bridge alert management (all parts)*

IMO Resolution A.694(17), *General requirements for shipborne radio equipment forming part of the global maritime distress and safety system (GMDSS) and for electronic navigational aids*

IMO Resolution MSC.94(72), *Performance standards for night vision equipment for high speed craft*

IMO Resolution MSC.191(79), *Performance standards for the presentation of navigation-related information on shipborne navigational displays*

IMO Resolution MSC.302(87), *Adoption of performance standards for Bridge Alert Management*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

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— IEC Electropedia: available at http://www.electropedia.org/

3.1
night vision equipment
technical fixed means enabling the position and aspect of objects above the water surface relative to one's own craft to be detected at night

[SOURCE: IMO MSC.94(72) 4]

3.2
high-speed craft
HSC
craft capable of a maximum speed in metres per second (m/s) equal to or exceeding $3{,}7V^{0{,}1667}$, where V is the displacement corresponding to the design waterline

[SOURCE: IMO HSC Code 2000]

3.3
test target for sea trials
target that simulates the real hazard of a surface object that can be found at sea such as, small unlit boats, floating logs, oil drums, containers, buoys, ice, hazardous waves and whales

[SOURCE: IMO MSC.94(72) 4]

3.4
lit vessel
vessel that, in addition to the standard navigation lights, has a row of five unshielded lamps with a luminous flux of 460 lm at 1 m horizontal spacing and 4 m above sea level

Note 1 to entry: This is equivalent to e.g. 21 W, 12 V.

3.5
performance check
short functional test carried out during or after a technical test to confirm that the equipment operates

[SOURCE: IEC 60945:2002, 3.1.4]

3.6
performance check (EMC)
short functional test carried out during or after an EMC test to confirm that the equipment complies with the required immunity performance criteria

[SOURCE: IEC 60945:2002, 3.1.5]

3.7
performance test
measurement or a group of measurements carried out during or after a technical test to confirm that the equipment complies with selected parameters as defined in the equipment standard

[SOURCE: IEC 60945:2002, 3.1.6]

3.8
single operator action
procedure achieved by no more than one hard-key or soft-key action, excluding any necessary cursor movements, or voice actuation using programmed codes

[SOURCE: MSC.252(83), Appendix 1]

3.9
field of view
FoV
solid angle through which a detector with mounted optic is sensitive to electromagnetic radiation

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3.10
instantaneous field of view
iFoV
angle subtended by a single detector element on the axis of the optical system

Note 1 to entry: iFoV is used as measure of the spatial resolution of a remote sensing imaging system.

4 Performance requirements

4.1 Functions and their availability

[IMO MSC.94(72), 5.1] *At night, night vision equipment* shall *be capable of detecting objects* at least each second *above the water's surface within a certain distance from one's own craft, and of displaying the information pictorially in real time,* at least each second*, to assist in collision avoidance and safe navigation.*

This requirement is fulfilled if the sea trials in 5.5 and the requirement in 4.4 are met.

4.2 Continuous operation

[IMO MSC.94(72), 5.2.1] *Night vision equipment on board HSC, while navigating at sea,* shall *be capable of continuous operation from after sunset until before sunrise. After the equipment has been switched on it* shall *be operational in less than 15 minutes.*

See 5.4.2.4.

4.3 Standard test target

[IMO MSC.94(72), 5.2.2] *The standard test target* shall *be a black metal target of such a size that when at least 50 % is immersed, 1,5 m long and 0,5 m high remains above the water at right angles to the desired direction of detection. Administration may use other smaller targets to reflect local conditions.*

See 5.5.2 for more detailed specification of the standard test target.

4.4 Detection range

[IMO MSC.94(72), 5.2.3] *With the required field of view, the equipment* shall *detect the standard test target at a distance of not less than 600 m with a minimum probability of 90 %, when the target has been immersed in the sea for at least 24 hours under mean starlight conditions without clouds and without moon.*

See 5.4.3.2, 5.4.4.5 and 5.5.4.2.

4.5 Field of view

[IMO MSC.94(72), 5.2.4] *The required horizontal field of view* shall *be at least 20°, 10° on either side of the bow. The vertical field of view* shall *be at least 12° and* shall *be sufficient to enable the equipment to fulfill the performance requirements of MSC.94(72) as well as being able to see the horizon.*

Optionally other fields of view may be provided. Their selection shall *be made with a non-locking switch, which returns to the required field of view when released.*

See 5.4.2.5.

4.6 Pan and tilt ranges of the field of view

[IMO MSC.94(72), 5.2.5] *The axis of the field of view of the equipment* shall *be capable of being moved at least 20° horizontally to either side.*

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