DRAFT INTERNATIONAL STANDARD

ISO/DIS 16273

ISO/TC **8**/SC **6**	Secretariat: **JISC**
Voting begins on: **2019-12-06**	Voting terminates on: **2020-02-28**

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

ICS: 47.020.70

This document is circulated as received from the committee secretariat.

Reference number
ISO/DIS 16273:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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" and 3.8 "single operation" have been added,

— 4.8 "Stabilization 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 check", former 6.3, has been modified,

— 5.1.3 "Performance check (EMC)" has been added,

— 5.1.1 "Performance test" has been added,

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

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

— 5.4.4 "Test of actife 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, have been modified, the surface of test specimen has benn specified,

— Annex D (normative) "Measurement of MTDP (Minimum Temperature Difference Perceived) of thermal imagers" has been added,

— Annex E (normative) "Stabilization test" 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..

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 International Standard applies to operational and performance requirements and methods of testing for night vision equipment fitted to high-speed craft in accordance with the International Code of Safety for High-Speed Craft (HSC code), Chapter 13, of the International Maritime Organisation (IMO) and the IMO performance standards MSC.94 (72) for night vision equipment for HSC.

NOTE All texts of this International Standard, whose wording is identical to that in IMO MSC.94 (72), are printed in italics, and the resolution and paragraph numbers are indicated 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.

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 61924-2, *Maritime navigation and radiocommunication equipment and systems — Integrated navigation systems — Part 2: Modular structure for INS - Operational and performance 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 62288, *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 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, 302(87), Adoption of performance standards for Bridge Alert Management

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

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*

International Code of Safety for High-Speed Craft (HSC Code)

STANAG 4349 (*MAS/186-Land/4349, 19 June 1996*)

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:

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

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

3.1
night vision equipment
any 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
any craft to which the definition in chapter 1 of the HSC Code applies

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

3.3
test target for sea trials
a 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
a 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
a 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)
a 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
a 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]

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 4.4 have been 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 5.4.2.5.

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.*

The elevation axis of the field of view shall *be capable of being adjusted of at least 10° to compensate for the trim of the craft.*

See 5.4.2.6.

4.7 Speeds of panning of the field of view

[IMO MSC.94(72), 5.2.6] *By activation of a single control element, the axis of the field of view* shall *be capable of being returned automatically to the ahead position at a minimum angular speed of 30°/s. The system* shall *be capable of panning at a minimum angular speed of 30°/s.*

The maximum angular speed shall be at least 30°/s. The operational angular speed may be lower.

See 5.4.2.6.

4.8 Stabilization of the field of view against the motions of the vessel

The imaging system shall not show a shift of more than iFoV (e.g 0,83 mrad) when looking onto a fixed onshore target under ship's movement at sea.

See 5.2.3.

4.9 Heading marker indication

[IMO MSC.94(72), 5.2.7] *When inside the field of view, the graphical ahead mark of the craft* shall *be indicated on the display with an error not greater than ± 1°.*

When the sensor/camera is orientated right ahead, the graphical heading marker shall be displayed in the centre with an error not greater than +/- 1°.

When outside the field of view, a visual indication of relative bearing with an error not greater than ± 1° shall *be provided.*

See 5.4.2.6.

4.10 Clear view

[IMO MSC.94(72), 5.2.9] *Arrangement* shall *be provided to ensure efficient cleaning of the sensor head/ lens from the operating position. Administration may require some additional facilities such as de-icing.*

Essential cleaning of the sensor head and/or lens needs to be performed before the use of the night vision equipment. During operation mainly dried salt mist and spray could occur and needs to be removed by a cleaning device to get back a clear view. The technical way how to achieve that result shall not be described in any ISO standard.

See 5.4.2.8.

4.11 Roll and pitch

[IMO MSC.94(72), 5.2.8] *the performance of the night vision equipment* shall *be such that when the craft is rolling and/or pitching up to ± 10°, the performance requirements in this International Standard* shall *be complied with.*

See 5.2.3.

4.12 Optical interference

[IMO MSC.94(72), 5.2.10] *Measures* shall *be taken, to ensure that objects commonly encountered at sea and in ports* shall *not be displayed less clearly on the monitor of the night vision equipment because of dazzle effects, reflection, blooming, or any other effects due to the surroundings.*

See 5.2.4.

4.13 Line of sight

Vibrations shall not disturb the created image for the operator.

See 5.2.5.

4.14 Controls and ergonomics

[IMO MSC.94(72), 6] t*he night vision equipment* shall *be designed in accordance with sound ergonomic principles.*

The number of operational controls shall *be limited to the minimum required for operation.*

Whilst in operational mode, double functions of controls shall *be avoided on such controls as for pan, vertical trim, field of view and other essential functions.*

The functions of the individual operational controls shall *be clearly labelled.*

The operational functions of night vision equipment shall *be activated directly through the operational controls; menu-driven controls* shall *be avoided.*

The operational controls shall *be clearly identifiable in the dark. If illumination is used, the brightness* shall *be adjustable.*

The operational controls of night vision equipment shall *meet the requirements of IMO Resolution A.694(17) as well as applicable requirements of IEC 60945.*

4.15 Presentation of information

[IMO MSC.94(72), 6.3] *the status of operation of the equipment* shall *be continuously displayed.*

The display shall *be non-dazzling and non-flickering. The display* shall *be capable of displaying a visible image of at least 180 mm in diagonal.*

The selected field of view, if more than one is provided, (see 4.7) shall *be continuously indicated at the operating position.*

The image shall be presented on the display, with the same aspect ratio as the sensors, as default (natural picture).

Any processing of the image on user demand is allowed as a temporary aid to enhance the detection of objects. The fact that any processing is in operation shall be permanently indicated by means next to the image. The navigation personnel shall be able to return to the unaltered image, only processed by an automatic gain control algorithm, in a single one-handed operation. The latency period of the processing shall not exceed 250 ms. Unaltered means that only point operations which not consider the pixels neighbourhood, are applied to the image raw data, such as contrast and brightness enhancement or tone mapping.

Additional information may be displayed, but shall not mask, obscure or degrade essential information required for the display by its primary task as specified in this standard.

The refresh rate for an optical system shall be at least 60 Hz.

The presentation of navigation-related information on navigational displays shall be in accordance with MSC.191(79) and IEC 62288.

See 5.4.2.2.