INTERNATIONAL STANDARD

ISO 22555

First edition
2007-09-15

Ships and marine technology — Propeller pitch indicators

Navires et technologie maritime — Indicateurs de pas du propulseur

Reference number
ISO 22555:2007(E)

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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.

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.

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ISO 22555 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation*.

Ships and marine technology — Propeller pitch indicators

1 Scope

This International Standard specifies the construction, performance requirements, methods of testing and required test results for the propeller pitch indicators (hereinafter referred to as “indicator system”) required by clause 2.5.4, Regulation 19, chapter V, SOLAS 1974 (as amended, 2000).

This International Standard is associated with IMO Resolution A.694 (17) and IEC 60945.

Where a requirement in this International Standard differs from IEC 60945, the requirement in this International Standard takes precedence.

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.

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

IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems — Digital interfaces — Part 1: Single talker and multiple listeners*

IEC 61162-2, *Maritime navigation and radiocommunication equipment and systems — Digital interfaces — Part 2: Single talker and multiple listeners, high-speed transmission*

3 Terms and definitions

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

3.1
propeller pitch indicator
remote device capable of indicating the angular position of moving propeller blades between their maximum angular setting on either side of their neutral position on the equipment to which they are mounted

3.2
indicator
means by which the state of the equipment or machinery is represented to an observer

NOTE An indicator shows both the sense and magnitude of the information it presents. An indicator can be analog or digital.

3.3
analog type indicator
indicator that shows the pitch angle in a continuous way, such as by means of an arrow pointer and graduated scale

3.4
digital type indicator
indicator that shows the pitch angle in a discrete, alphanumeric way

3.5
calibration accuracy
difference between the angle registered by the transmitter and the angle indicated by an indicator

3.6
damping efficiency
time elapsed for the indicated angle to match the angle of the transmitter shaft

4 Construction of indicator system

4.1 Indicator system

4.1.1 An indicator system should show information on the state of the equipment or machinery to which it is connected at locations adjacent to or remote from the equipment or machinery. At the equipment or machinery, such systems will generally comprise a sensor and transmitter; at the observer's location, such systems will generally contain an indicator.

In general, the system construction shall comply with the following requirements.

4.1.2 The indicator system enclosures shall be robust and constructed so as to facilitate easy adjustment and maintenance.

4.1.3 The indicator system shall be provided with an earthing terminal or shall be so constructed as to be capable of being connected to an electrical earth.

4.1.4 An analog type indicator can be used as indicator(s) of the indicator system. It may be additionally provided by a digital type if fitted.

4.2 Transmitter

The transmitter shall be driven by suitable means from the controllable pitch propeller activating mechanism.

4.3 Indicator

4.3.1 An analog indicator shall be of a centre-zero type (preferably circular). Where a circular scale indicator is used, the zero position shall be uppermost.

The direction “Ahead” or “Starboard” shall be to the right of the zero graduation; the directions “Astern” or “Port” shall be to the left of the zero graduation.

4.3.2 The digital indicator shall indicate the pitch angle as readily legible digital figures preceded by a symbol or letter(s) indicating direction. The directions “Ahead” or “Starboard” shall be identified by the “plus” sign or by the letters “AH (ST)”, while “Astern” or “Port” shall be identified by a “minus” sign or by the letters “AS (PT)”.

4.3.3 The maximum angle indicated shall be the same for both Ahead/Starboard and Astern/Port and shall be no less than 40°.

4.3.4 Scale graduations shall be no smaller than 1°. Graduation marks corresponding to 5° increments shall be more prominent than those for intervening increments.

4.3.5 The pointer of an indicator shall be capable of being adjusted to zero.

4.3.6 The letters and graduations on the dial shall be such that the direction of ahead and astern can be clearly distinguished.

4.3.7 All illumination and lighting of an indicator shall be adjustable down to zero, except the control of the dimmers which shall remain readable.

4.3.8 The illumination and lighting of an indicator shall be arranged in order not to hinder an operator's vision at night and in order to make the scale, pointer and letters as equally visible as possible, even in dim light or the dark.

5 Performance requirements

5.1 General

The transmitter shall have the capacity to satisfy the requirements specified in 5.2, 5.3 and 5.4 when all connected indicators are operating simultaneously. The manufacturer shall clearly state the maximum number of indicator(s) or the capacity of connected indicator(s) that can be supported by a transmitter.

5.2 Calibration accuracy

To calibrate the indicator system, the shaft of a transmitter is gradually rotated from the zero position to the maximum angle ahead (Starboard) or astern (Port), and the angles shown by an indicator are recorded every 5° of rotation. The difference between the angle of the transmitter shaft and the corresponding value shown at an indicator shall be within $\pm$ 1,5 % of the sum of the maximum angle in both directions.

5.3 Damping efficiency

If a voltage is suddenly applied while the transmitter shaft is approximately at half of full-scale position and the indicator pointer is set to the zero position, the pointer shall be reset to that position within 5 s or less.

5.4 Power supply fluctuation

5.4.1 The performance specified in 5.1 and 5.2 shall be maintained when the system is subject to the power supply fluctuations.

5.4.2 After repeated makings and breakings, the designated performance shall be demonstrated without carrying out manual adjustments.

5.4.3 When the rated voltage and frequency are subjected to the combinations of fluctuations, as given in Table 1, the designated performance shall be demonstrated.

Table 1 — Fluctuation rate of the rated voltage and frequency

Settled condition	Voltage fluctuation	$\pm$ 10 %	Fluctuating period: 600 s
	Frequency fluctuation	$\pm$ 5 %	
Transient condition	Voltage fluctuation	$\pm$ 20 %	Fluctuating period: 3 s
	Frequency fluctuation	$\pm$ 10 %	

5.5 Insulation resistance and high voltage

When insulation resistance and high voltage tests are to be carried out, IEC 60092-504 may be applied.

6 Methods of testing and required test results

6.1 Construction

The construction of an indicator system shall comply with the requirements specified in Clause 4.

6.2 Environmental test

Unless otherwise stated in this International Standard, all the tests shall be carried out according to the requirements of IEC 60945. The manufacturer shall determine which components of the indicator system will be protected or exposed, as defined in IEC 60945.

6.3 Calibration test

The calibration test shall be carried out in accordance with 5.2 and shall satisfy the requirements specified therein.

6.4 Damping test

The damping test shall be carried out in accordance with 5.3 and shall satisfy the requirements specified therein.

6.5 Power supply fluctuation test

The power supply fluctuation test shall be carried out in accordance with 5.4 and shall satisfy the requirements specified therein.

7 Interface

When the indicator system provides interface facilities, they shall meet the requirements of the appropriate international marine interface standards IEC 61162-1 and IEC 61162-2.

8 Marking

8.1 Each unit of an indicator system shall be marked with the following:

— identification of the manufacturer;

— equipment type number or model identification number under which it was type tested;

— serial number of the unit.

8.2 Each unit shall be marked with the minimum safe distance from a magnetic compass at which it may be mounted (for bridge installation). The safe distance shall be measured in accordance with IEC 60945.

9 Information

The manufacturer shall provide adequate equipment documentation to enable competent members of a ship's crew to operate and maintain the equipment efficiently.

Bibliography

[1] ISO 8468, *Ships and marine technology — Ship's bridge layout and associated equipment — Requirements and guidelines*

[2] IEC 60092-504, *Electrical installations in ships — Part 504: Special features — Control and instrumentation*

[3] *International Convention for the Safety of Life at Sea* (SOLAS), 1974 (amended)

[4] 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*

ICS 47.020.70

Price based on 5 pages