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**Ships and marine technology —  
Propeller pitch indicators**

*Navires et technologie maritime — Indicateurs de pas du propulseur*



Reference number  
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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](http://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](http://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 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](http://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 22555:2007), which has been technically revised.

The main changes are as follows:

- in [Clause 2](#), deleted IEC 61162-1 and IEC 61162-2;
- in [4.1](#) and [6.1](#), added a provision on displays for presentation and a reference to IEC 62288;
- in new [4.4](#) and [6.6](#), added a provision on alerts and a reference to IEC 62923-1 and IEC 62923-2;
- in [Clause 7](#), updated interface requirements;
- in the Bibliography, added IEC 61162-1, IEC 61162-2, IEC 61162-450, IEC 62288, IEC 62923-1, IEC 62923-2, IMO Resolution MSC.191 (79), IMO Resolution MSC.302 (87) and IMO Resolution MSC.466 (101).

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](http://www.iso.org/members.html).

# Ships and marine technology — Propeller pitch indicators

## 1 Scope

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

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

## 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, *Marine navigation and radiocommunication equipment and systems — General requirements — Methods of testing and required test results*

## 3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 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 1 to entry: An indicator shows both the sense and magnitude of the information it presents. An indicator can be analogue or digital.

### 3.3

#### **analogue-type indicator**

*indicator* (3.2) that shows the pitch angle in a continuous way, such as by means of an arrow pointer and a graduated scale

### 3.4

#### **digital-type indicator**

*indicator* (3.2) 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* (3.2)

### 3.6

#### damping efficiency

time elapsed for the indicated angle to match the angle of the transmitter shaft

## 4 Construction of an indicator system

### 4.1 Indicator system

- a) 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 generally comprise a sensor and transmitter; at the observer's location, such systems generally contain an indicator.
- b) In general, the system construction shall comply with the following requirements:
  - 1) the indicator system enclosures shall be robust and constructed so as to facilitate easy adjustment and maintenance;
  - 2) 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;
  - 3) an analogue-type indicator can be used as indicator(s) of the indicator system. It may be additionally provided by a digital type if fitted. If a display is used for presentation, the equipment shall comply with MSC.191 (79), as amended by MSC.466 (101), and with IEC 62288.

### 4.2 Transmitter

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

### 4.3 Indicator

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

The directions '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.
- b) A digital-type indicator shall indicate the pitch angle as readily legible digital figures preceded by a symbol or letter(s) indicating the 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)'.
- c) The maximum angle indicated shall be the same for both ahead/starboard and astern/port and shall be no less than 40°.
- d) Scale graduations shall be no smaller than 1°. Graduation marks corresponding to 5° increments shall be more prominent than those for intervening increments.
- e) The pointer of an indicator shall be capable of being adjusted to zero.
- f) The letters and graduations on the dial shall be such that the direction of ahead and astern can be clearly distinguished.
- g) All illumination and lighting of an indicator shall be adjustable down to zero, except the control of the dimmers, which shall remain readable.

- h) 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 in the dark.

#### 4.4 Alert

If the equipment is capable of raising an alert, it shall comply with MSC.302 (87), IEC 62923-1 and IEC 62923-2.

## 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

- The performance specified in 5.1 and 5.2 shall be maintained when the system is subjected to the power supply fluctuations.
- After repeated makings and breakings, the designated performance shall be demonstrated without carrying out manual adjustments.
- 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**

<b>Settled condition</b>	Voltage fluctuation	$\pm 10$ %	Fluctuating period: 600 s
	Frequency fluctuation	$\pm 5$ %	
<b>Transient condition</b>	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](#).

If a display is used for presentation, confirm using documented evidence that the equipment complies with IEC 62288.

### 6.2 Environmental test

Unless otherwise stated in this document, all the tests shall be carried out according to the requirements of IEC 60945. The manufacturer shall determine which components of the indicator system shall 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.

### 6.6 Alert test

If the equipment under test is capable of raising an alert, confirm using documented evidence that the equipment complies with IEC 62923-1 and IEC 62923-2.

## 7 Interface

If the indicator system provides an interface facility, it shall meet the requirements prescribed in IEC 61162-1, IEC 61162-2 or IEC 61162-450.

## 8 Marking

- a) 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.
- b) 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] IEC 61162-1, *Maritime navigation and radiocommunication equipment and systems — Digital interfaces — Part 1: Single talker and multiple listeners*
- [4] IEC 61162-2, *Maritime navigation and radiocommunication equipment and systems — Digital interfaces — Part 2: Single talker and multiple listeners, high-speed transmission*
- [5] IEC 61162-450, *Maritime navigation and radiocommunication equipment and systems — Digital interfaces — Part 450: Multiple talkers and multiple listeners — Ethernet interconnection*
- [6] 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*
- [7] IEC 62923-1, *Maritime navigation and radiocommunication equipment and systems — Bridge alert management — Part 1: Operational and performance requirements, methods of testing and required test results*
- [8] IEC 62923-2, *Maritime navigation and radiocommunication equipment and systems — Bridge alert management — Part 2: Alert and cluster identifiers and other additional features*
- [9] *International Convention for the Safety of Life at Sea (SOLAS), 1974 (amended)*
- [10] 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*
- [11] IMO Resolution MSC 191(79), *Performance standards for the presentation of navigation-related information on shipborne navigational displays*
- [12] IMO Resolution MSC 302(87), *Performance standards for bridge alert management*
- [13] IMO Resolution MSC 466(101), *Amendments to the performance standards for the presentation of navigation-related information on shipborne navigational displays (Resolution MSC.191(79))*

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