## INTERNATIONAL STANDARD



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# Ships and marine technology — Propeller shaft revolution indicators — Electric type and electronic type

Navires et technologie maritime — Indicateurs de vitesse d'arbre du propulseur — Type électrique et type électronique

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<u>ISO 22554:2007</u> https://standards.iteh.ai/catalog/standards/sist/036c9381-16c2-4440-b788-33ba7d140da8/iso-22554-2007



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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 22554 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation*.

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## Ships and marine technology — Propeller shaft revolution indicators — Electric type and electronic type

#### 1 Scope

This International Standard specifies the construction, performance requirements, methods of testing and required test results for electric and electronic propeller shaft revolution 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.

NOTE When this indicator system can be used as the tachometer for the engine of a ship, its usage as the tachometer will be accepted.

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### 2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies a Forgundated references, the datest edition of the referenced document (including any amendments) applies. 33ba7d140da8/iso-22554-2007

IEC 60945, Maritime navigation 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 shaft revolution indicator

remote device capable of indicating the number of revolutions per minute only, or the number of revolutions per minute and the direction of the revolution of the shaft on which it is mounted

#### 3.2

#### electric propeller shaft revolution indicator

electric type indicator that employs a generator driven by the propeller shaft via the driving unit that transmits the revolution speed (number of revolutions per minute) and direction of rotation of the propeller shaft

#### 3.3

#### electronic propeller shaft revolution indicator

electronic type indicator that employs a revolution sensor that detects pulses generated by a gear turning the propeller shaft or a circular disc with a slit and transmits these pulses to a signal converter

#### 3.4

#### 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.

#### 3.5

#### analog type indicator

indicator that shows the revolution speed in a continuous way, such as by means of an arrow pointer and graduated scale

#### 3.6

#### digital type indicator

indicator that shows the revolution speed in a discrete, alphanumeric way

#### 3.7

#### calibration accuracy

difference between the true revolution speed of a propeller shaft and the revolution speed indicated by the indicator (standards.iteh.ai)

#### 3.8

#### ISO 22554:2007

damping efficiency amount by which an indicator initially over-reads in response to a sudden signal input, as a percentage of the maximum reading

#### Construction of indicator system 4

#### 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 with instrument panel lights and the instrument panel light dimmers shall be equipped with a grounding terminal or shall be constructed so that an earth grounding is securely established. In the electronic type case, however, these requirements shall also be applied to the signal converters.

**4.1.4** The indicator system may be self-contained, or it may form part of, or derive information from, any other appropriate equipment.

**4.1.5** 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.



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- 1 indicators
- 2 indicator
- 3 arrow pointer
- iTeh STANDARD PREVIEW 4 electric cable
- 5 junction box (as appropriate) / signal converter standards.iteh.ai)
- 6 transmitter
- 7 driving unit / revolution sensor revolution mechanism
- ISO 22554:2007
- transmitters (term used in the broad sense, including the functions of signal pickup and transmission) 9

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10 indicator system

#### Figure 1 — Construction of an indicator system

#### 4.2 Transmitters

#### 4.2.1 General

The indicator system shall fulfil the following individual structural requirements.

#### 4.2.2 Electric type

#### 4.2.2.1 Driving unit

Driving units shall comply with the following requirements. However, an indicator directly connected to a camshaft or another part of the main machine shall not be equipped with a driving unit.

- a) The driving unit shall be constructed so that the revolution of a propeller shaft is conveyed to the transmitter smoothly and without slippage.
- b) Recommendations call for providing the driving unit with a clutch system so that transmitter can be suspended and driven at any time while the propeller shaft is spinning.
- c) A gear mechanism is recommended for imparting drive force from the propeller shaft system.

- d) The drive gear should permit secure, easy mounting on the revolution parts of the propeller shaft.
- e) Where the transmitter drive includes pivot connections, such connections shall be designed to resist loosening when subject to vibration.

#### 4.2.2.2 Transmitter

The transmitter shall comply with the following requirements.

- a) Driven by the propeller shaft via the conductor, the transmitter employs an electric generator that transmits the revolution speed (number of revolutions per minute) and direction of propeller shaft rotation.
- b) The transmitter shall have sufficient capacity to simultaneously drive all connected indicator(s). Also, additional capacity shall be taken into consideration if the transmitter provides output to automation and measurement devices. The manufacturer should specify the capacity of connected indicators.

#### 4.2.2.3 Junction box

Junction boxes shall be capable of being connected to the required number of indicators. Junction boxes shall be equipped with a compensating device to prevent indicator errors, regardless of the number of indicators.

#### 4.2.3 Electronic type

## 4.2.3.1 Revolution sensor iTeh STANDARD PREVIEW

Revolution sensors shall be constructed so as to correctly detect pulses generated by a propeller shaft's turning gear or circular disc with slit.

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#### 4.2.3.2 Signal converter https://standards.iteh.ai/catalog/standards/sist/036c9381-16c2-4440-b788-

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Signal converters shall be constructed so that each can convert pulses from the propeller shaft into electric signals for output.

#### 4.3 Indicator

**4.3.1** The indicator may consist of a receiving portion and indication portion. A receiving portion is electrically connected with a transmitter and indication portion is so constructed that it indicates the direction of the rotation and the number of revolutions per minute of a propeller shaft.

The direction "Ahead" shall be such as identified by the "plus" sign or by the letters "AH" or "AHEAD", while "Astern" shall be identified by the "minus" sign or by the letters "AS" or "ASTERN".

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

**4.3.3** The clockwise direction of a revolution speed panel shall indicate the forward movement of a ship. It is recommended that the maximum scale value for both forward and backward movements be set to one of 100, 125, 150, 200, 250, 300, 400 or 450 min<sup>-1</sup> (rpm). Additional linear range scales may be provided.

**4.3.4** The calibration of zero point of an indicator and its indication shall be capable of being adjusted by appropriate measures.

**4.3.5** An indicator shall be constructed so that it can be read easily and clearly.

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

**4.3.7** 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

Any transmitter shall have the capacity to satisfy the requirements of this clause when all connected indicators are operating simultaneously.

#### 5.2 Balance

When an indicator without current rotates to either side by  $30^{\circ}$  from its upright position, the deviation of a pointer from its zero point shall be within  $\pm$  1 % of the combined maximum scale values ahead and astern for an indicator with a visible diameter of nearly 150 mm; and  $\pm$  2 % for an indicator with a visible diameter of less than 150 mm.

#### 5.3 Friction error

When the power at the electric signal equivalent to the number of revolutions of an indicator is applied to the indicator, to allow the pointer to gradually move forward and backward to the maximum scales to find calibration accuracy at points of 0 %, 25 %, 75 %, and 100 % of the maximum scale value, respectively, the difference between the indication of forward and backward movement shall be within  $\pm$  0,5 % of the combined maximum scale values for ahead and astern movement for an indicator with visible diameter of nearly 150 mm; and  $\pm$  1,0 % for an indicator with visible diameter of less than 150 mm.

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#### 5.4 Calibration accuracy

When a revolution sensor and a signal converter are operated using an approved testing machine to determine calibration accuracy at points of 0 %, 25 %, 50 %, 75 %, and 100 % of the maximum scale value of an indicator respectively, the margin of error with respect to the approved testing machine shall be within  $\pm$  0,5 % of the combined maximum scale values ahead and astern for an indicator with visible diameter of nearly 150 mm; and  $\pm$  1,0 % for an indicator with visible diameter of less than 150 mm (using 20 °C as the reference temperature).

#### 5.5 Damping

When a test electric signal equivalent to half of the maximum scale value is suddenly applied to an indicator, the movements of the indicator pointer shall not show a value exceeding two-thirds of the maximum value.

#### 5.6 Zero point

When an electric signal equivalent to an indicator's maximum scale value is applied to an indicator for 30 min, after which power is turned off and the zero position error is immediately corrected by eliminating friction from the moving parts by gently patting the outer casing, any zero point error shall be within  $\pm$  0,25% of the combined maximum scale values ahead and astern for an indication portion with visible diameter of nearly 150 mm or greater; and  $\pm$  0,5% for an indication portion with a visible diameter of less than 150 mm.

#### 5.7 Output electric signal of a signal converter

The output electric signal equivalent to the maximum scale value of indicator(s) shall be sufficient to simultaneously operate all connected indicator(s).