INTERNATIONAL STANDARD

ISO 20672

Second edition
2022-02

Ships and marine technology — Rate of turn indicators

Navires et technologie maritime — Fréquence des indicateurs de direction

Reference number
ISO 20672:2022(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
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 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 20672:2007), which has been technically revised. It also incorporates the Technical Corrigendum ISO 20672:2007/Cor 1:2008.

The main changes are as follows:

— in Clause 2, deleted IEC 61162-1 and IEC 61162-2;

— in 4.5 and 6.1, added a provision on displays for presentation and a reference to IEC 62288;

— in new 4.6 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.

Ships and marine technology — Rate of turn indicators

1 Scope

This document specifies the construction, performance requirements, methods of testing and required test results for the rate of turn indicators required by Clause 2.9.1, Regulation 19, chapter V, SOLAS 1974 (as amended, 2000).

It is based upon the requirements of IMO Resolution A.526(13), and is also associated with IMO Resolution A.694 (17) and IEC 60945.

Where a requirement in this document is different from that in IEC 60945, the requirement in this document takes precedence.

NOTE All requirements that are extracted from the recommendations of IMO Resolution A.526(13) on performance standards for rate of turn indicators 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, *Marine navigation and radiocommunication equipment and systems — General requirements — Methods of testing and required test results*

IMO Resolution A.526(13), *Performance standards for rate-of-turn indicators*

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
rate of turn indicator
indicator capable of indicating rates of turn in degrees per minute to starboard and to port of the ship to which it is fitted

Note 1 to entry: A rate of turn indicator may be self-contained; alternatively it may form part of, or derive information from, any other appropriate equipment.

[SOURCE: IMO Resolution A.526(13), 2.1 and 2.2, modified — in the definition, added “in degrees per minute”.]

3.2
analogue-type indicator
indicator that shows the rate of turn in a continuous way, such as by means of an arrow pointer and a graduated scale

3.3
digital-type indicator
indicator that shows the rate of turn in a discrete, alphanumeric way

3.4
full scale
range from 0° per minute to the greatest angular rate scale of port (or starboard) direction

4 Construction

4.1 General

The rate of turn indicators shall conform to IMO Resolution A.526(13) and the requirements in 4.2 to 4.6.

4.2 Indication

a) [IMO Resolution A.526(13), 2.3.1] *The indication required* shall *be provided by a centre-zero analogue type indicator (preferably circular). Where a circular scale indicator is used, the zero* shall *be uppermost.*

b) [IMO Resolution A.526(13), 2.3.2] *A turn of ship to port* shall *be indicated on the left of the zero point and a starboard turn to the right of the zero point. If the actual rate of turn exceeds full scale deflection, this* shall *be clearly indicated on the display.*

c) [IMO Resolution A.526(13), 2.3.3] *In addition, an alphanumeric display may be provided. Positive indication of port and starboard* shall *be provided on such displays.*

d) [IMO Resolution A.526(13), 2.3.4] *The length of scale in either direction from zero* shall *not be less than 120 mm. The sensitivity of the system* shall *ensure that a change in the rate of turn of 1° per minute is represented by a distance of not less than 4 mm on its scale.*

4.3 Range scales

a) [IMO Resolution A.526(13), 2.4.1] *A linear range scale of not less than ± 30° per minute* shall *be provided.* The scale for 30° per minute indicator shall *be marked in intervals of 1° per minute on both sides of zero. The scale* shall *be marked with figures every 10° per minute. Every 10° mark* shall *be significantly longer than the 5° mark which in turn* shall *be significantly longer than the 1° mark. The marks and figures* shall *preferably be red or a light colour on a dark background*.

b) [IMO Resolution A.526(13), 2.4.2] *Additional linear range scales* of ± 120° and ± 300° per minute *may be provided* and the scale and figures of each range shall be marked in intervals proportionate to the 30° per minutes indicator as defined in 4.3 a) (see Table 1).

Table 1 — Scaling reference

Scale	Numerical mark	Short mark	Half mark	Longer mark
30°	0, 10, 20, 30	every 1 deg	every 5 deg	every 10 deg
120°	0, 40, 80, 120	every 4 deg	every 20 deg	every 40 deg
300°	0, 100, 200, 300	every 10 deg	every 50 deg	every 100 deg

Any other range scale may be acceptable under approval by the appropriate authority.

4.4 Illumination and lighting

The illumination and lighting of the 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 darkness.

4.5 Type of indicator

The rate of turn indicator shall be an analogue-type indicator. A digital-type indicator may additionally be used, if fitted.

If a display is used for presentation, the equipment shall comply with MSC.191(79), as amended by MSC.466(101), and IEC 62288.

4.6 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 Accuracy

a) [IMO Resolution A.526(13), 2.5.1] *The indicated rate of turn* shall *not deviate from the actual rate of turn of the ship by more than 0,5° per minute plus 5 per cent of the indicated rate of turn of the ship. These values include the influence of earth rate*.

b) [IMO Resolution A.526(13), 2.5.2] *Periodic rolling motion of the ship with an amplitude of ± 5° and period of up to 25 seconds and periodic pitching motion with an amplitude of ± 1° and period of up to 20 seconds* shall *not change the mean value of the indicated rate of turn by more than ± 0,5° per minute*.

c) [IMO Resolution A.526(13), 2.5.3] A *rate of turn indicator* shall *meet these accuracy requirements at all ship speeds up to* 30 *knots*.

d) [IMO Resolution A.526(13), 2.4.3] The *damping of the rate of turn indicators* shall *be provided with a time constant which may be varied during operation in the range zero to at least 10 seconds*.

5.2 Operation

a) [IMO Resolution A.526(13), 3.1] A *rate of turn indicator* shall *be ready for operation and comply with* this document *within 4 minutes of being switched on*.

b) [IMO Resolution A.526(13), 3.2] *The design* shall *be such that whether operating or not the rate of turn indicator will not degrade the performance of any other equipment to which it is connected*.

c) [IMO Resolution A.526(13), 3.3] *The rate of turn indicator* shall *include a means of enabling the operator to verify that it is operating*.

5.3 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 the rate of turn indicator 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 tests

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 rate of turn indicators shall be protected or exposed, as defined in IEC 60945.

6.3 Accuracy test

a) The following tests shall satisfy the accuracy requirements of 5.1 a). The indicated rate of turn shall be tested with a dummy signal or internal sensor signal in accordance with 6.3 b), 6.3 c) and 6.3 d).

b) Rate of turn indicators shall be set on a test table and tested with a dummy signal or internal sensor signal under one of following conditions:

1)	±30°/min indicator:	pitch axis 1°, period 20 s;	roll axis 5°, period 25 s;
2)	±120°/min indicator:	pitch axis 1°, period 6 s;	roll axis 5°, period 15 s;
3)	±300°/min indicator:	pitch axis 1°, period 6 s;	roll axis 5°, period 15 s.

Indicator data shall be taken at 10 s intervals for a period of 10 min. The resultant mean value of the indicated rate of turn shall meet the requirement of 5.1 b).

c) The rate of turn indicator shall be tested for consistency at simulated ship speeds up to 30 knots using a dummy signal or internal sensor signal which contains the ship's speed factors.

d) Damping of the rate of turn indicator shall be tested in response to a step-shaped dummy signal or internal sensor signal. The signal may be adjusted to have time constant range of zero to 10 s.

6.4 Operation test

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

6.5 Insulation resistance and high voltage test

Insulation resistance and high voltage test shall be carried out in accordance with 5.3 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 rate of turn indicator provides an interface facility, it shall meet the requirements prescribed in IEC 61162-1, IEC 61162-2 or IEC 61162-450.

8 Marking and identification

Each unit of a rate of turn indicator 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.

Each unit shall be marked with the minimum safe distance from a magnetic compass (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))*