
**Ships and marine technology —
Transmitting heading devices
(THDs) —**

**Part 1:
Gyro-compasses**

iTeh STANDARD PREVIEW
(standards.iteh.ai)
*Navires et technologie maritime — Dispositifs de pilotage à
transmission de données —
Partie 1: Compas gyroscopiques*

ISO 22090-1:2014

<https://standards.iteh.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 22090-1:2014

<https://standards.iteh.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Performance requirements	4
4.1 Functionality.....	4
4.2 Continuous operation.....	4
4.3 Information.....	4
4.4 Fore and aft mark.....	4
4.5 Speed error correction.....	4
4.6 Heading information.....	5
4.7 Status indication.....	5
4.8 Alert signal.....	5
4.9 Interface.....	5
5 Accuracy	5
5.1 General.....	5
5.2 Accuracy of transmission data.....	5
5.3 Accuracy under static condition.....	6
5.4 Accuracy under dynamic condition.....	6
6 Type tests	6
6.1 General.....	6
6.2 Settling time test.....	7
6.3 Static error (settle point error) test.....	7
6.4 Settle point heading repeatability test.....	7
6.5 Settling time on a Scorsby table.....	7
6.6 Scorsby test.....	8
6.7 Intercardinal motion test.....	8
6.8 Follow-up error test.....	8
6.9 Speed error correction test.....	8
6.10 General requirement test.....	9
6.11 Electromagnetic compatibility test.....	10
6.12 Interface test.....	10
7 Marking and identification	11
Annex A (informative) Equivalent requirements in ISO 22090-1 and IMO Resolution	12
Bibliography	13

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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation and ship operations*.

This second edition cancels and replaces the first edition (ISO 22090-1:2002), of which has been technically revised. It also replaces ISO 22090-1:2002/Cor 1:2005.

ISO 22090 consists of the following parts, under the general title *Ships and marine technology — Transmitting heading devices (THDs)*:

- Part 1: *Gyro-compasses*
- Part 2: *Geomagnetic principles*
- Part 3: *GNSS principles*

[Annex A](#) of this part of ISO 22090 is for information only.

Ships and marine technology — Transmitting heading devices (THDs) —

Part 1: Gyro-compasses

1 Scope

This part of ISO 22090 specifies the construction, performance, and testing of gyro-compasses as transmitting heading device required by chapter V, SOLAS 1974 (as amended).

A Transmitting heading device (THD) is an electronic device that provides information about the ship's true heading.

In addition to the general requirements contained in IMO Resolution A.694(17) to which IEC 60945 is associated and the relevant standard for the sensing part used, the THD equipment shall comply with the following minimum requirements.

Where the IMO performance standards that apply to the sensing part do not specify a geographical operating area that the THD shall operate

- a) at maximum rate of turn 20°/s and
- b) from 70° latitude south to 70° latitude north as minimum.

The THDs complying with the requirements contained in this part of ISO 22090 can be used for heading information as contained in chapter V of the SOLAS Convention.

However, ships within a speed range of 30 kn to 70 kn should comply with the requirements of IMO Resolution A.821(19).

In addition, such THD should meet the dynamic requirements contained in the HSC Code, chapter 13 for the carriage of a suitable device providing heading information.

NOTE 1 Several technologies can be used to detect and transmit heading information. It is illogical to standardize the detection of the heading separately from the transmission of the heading. Therefore, separate parts of this part of ISO 22090 refer to different technologies. The requirements of this part of ISO 22090 only apply to gyroscopic technology. Other technologies are covered in other parts of ISO 22090.

NOTE 2 All requirements that are extracted from the recommendations of IMO Resolution MSC. 116(73) on performance standards for transmitting heading devices are printed in italics.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 25862, *Ships and marine technology — Marine magnetic compasses, binnacles and azimuth reading devices*

IEC 60945, *Marine 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*

IEC 61924-2, *Maritime navigation and radiocommunication equipment and systems — Integrated Navigation Systems (INS) — Part 2: Modular structure for INS — Operational and performance requirements, methods of testing and required test results*

IMO Resolution MSC.116(73), *Performance standards for marine transmitting heading devices (THDs)*

IMO Resolution MSC.252(83), *Adoption of the revised performance standards for integrated navigation system (INS)*

IMO Resolution MSC.302(87), *Adoption of performance standards for bridge alert management*

IMO Resolution A.424(XI), *Performance standards for gyro-compasses*

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 A.813(19), *General requirements for electromagnetic compatibility (EMC) for all electrical and electronic ship's equipment*

IMO Resolution A.821(19), *Performance standards for gyro-compasses for high-speed craft*

iTeh STANDARD PREVIEW

3 Terms and definitions (standards.iteh.ai)

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

[ISO 22090-1:2014](https://standards.iteh.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014)

3.1 gyro-compass <https://standards.iteh.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014>

complete equipment including all essential elements of the complete design including both the gyro-compass as heading sensor and the associated heading transmission system

3.2 heading

ship's heading to be input to the THD function

Note 1 to entry: It is defined by the direction of the vertical projection of the fore-and-aft line of the ship onto the horizontal plane. When measured relative to the true north, magnetic north, or compass north, it is respectively defined as true heading, magnetic heading, or compass heading, and is usually expressed in degrees as a three-figure group, starting from north, in a clockwise direction around the compass card.

3.3 sensing part

sensing function of detecting any heading information connected to the transmitting part

3.4 transmitting part

device which receives heading information from the sensing part and converts this to the required accurate signal

3.5 true heading

horizontal angle between the vertical plane passing through the true meridian and the vertical plane passing through the craft's fore and aft datum line, measured from true north (000°) clockwise through 360°

3.6 transmission and resolution error

error which is caused by the method used to transmit the original information to a receiving device

Note 1 to entry: *Such a method may have a limited capability to code any possible value of the information, e.g. step output with 1/6° resolution. This error is also caused by the method used inside the THD and at its output to code the information.*

3.7 static error

error caused by any reason and which stays unchanged in value during the operation of the system, measured under static conditions

Note 1 to entry: This error is the same as that defined in [3.12](#).

3.8 dynamic error

error caused by dynamic influences acting on the system, such as vibration, roll, pitch, or linear acceleration

Note 1 to entry: *This error may have an amplitude and usually a frequency related to the environmental influences and the parameters of the system itself.* This error is the same as defined in [3.13](#).

3.9 follow-up error

error caused by the delay between the existence of a value to be sensed and the availability of the corresponding signal or data stream at the output of the system

EXAMPLE *The difference between the real heading of a turning vessel and the available information at the output of the system.*

iTech STANDARD PREVIEW
(standards.itech.ai)

Note 1 to entry: *A follow-up error disappears when the system is static.*

3.10 settled

<https://standards.itech.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014>

stable situation when any three readings taken at intervals of 30 min are within a band of 0,7°, with the compass level and stationary

Note 1 to entry: The settling time is the elapsed time between the time of switch-on at the initial heading error and the third recording of the settle.

3.11 settle point heading

mean value of ten readings taken at 20 min intervals after the compass has settled as defined in [3.10](#)

3.12 settle point error

difference between the settle point heading as defined in [3.11](#) and the true heading

Note 1 to entry: See [3.7](#)

3.13 error

difference between the observed value and the settle point heading as defined in [3.11](#)

Note 1 to entry: See [3.8](#).

3.14 latitude error

error to which some gyro-compasses are subject and whose magnitude and sign depend upon the local latitude

3.15

speed error

error to which gyro-compasses are subject and whose magnitude and sign depend upon the speed, course, and latitude of the ship

3.16

master compass

main compass unit which supplies the heading information to the transmitting part or other navigational aids

3.17

Scorsby table

test machine which independently oscillates a platform about three axes and is used to simulate the motion of a ship

3.18

intercardinal motion

representing an integral motion of the ship and is used for error test within motion in dynamic simulation test

4 Performance requirements

4.1 Functionality

In this part of ISO 22090, the gyro-compass is specified as the function of THD.

The THD generates a heading signal and outputs a suitable signal for other devices.

Any sensing part defined in 3.3 may be included in the device.

If any correcting devices or parameters have been associated, they shall be protected against inadvertent operation.

Manually entered values used for electronic correction shall be indicated by adequate means.

Gyro-compass units shall conform to the requirements listed in 4.2 to 4.8.

4.2 Continuous operation

The equipment shall be capable of continuous operation under conditions of vibration, humidity, change of temperature, and variations of the power supply, as specified in 6.10.

4.3 Information

All displays with the exception of the sensor, and all outputs of heading shall indicate true heading.

Indication shall be displayed, readable to a tenth of a degree.

4.4 Fore and aft mark

The compass shall be marked to facilitate installation in fore and aft line of the ship.

4.5 Speed error correction

Means shall be provided for correcting the errors induced by speed and latitude. An approved accurate speed source shall be used for automatic speed error corrections.

4.6 Heading information

The THD shall provide true heading information to the other navigational equipment.

Heading information shall be provided as an output with accuracy as defined in [Clause 5](#).

4.7 Status indication

Status shall be indicated that the gyro-compass is ready to use.

4.8 Alert signal

An alert¹⁾ shall be provided to indicate malfunctions of the THD or a failure of the power supply. The alert shall conform to the presentation and handling requirements of Bridge Alert Management [IMO Res. MSC.302(87)]. A suitable interface shall be provided for alert communications with an Integrated Navigation System [IMO Res. MSC.252(83) and IEC 61924-2].

The following sentences shall be provided for the alert communications interface:

Sentences transmitted by the THD:

- ALR, HBT: see IEC 61162-1;
- ALC, ALF, ARC: see IEC 61924-2.

Sentences received by the THD:

- ACK, HBT: see IEC 61162-1; (standards.iteh.ai)
- ACN: see IEC 61924-2.

4.9 Interface

ISO 22090-1:2014
<https://standards.iteh.ai/catalog/standards/sist/f6adbf7b-f0f7-4440-8693-156d5307b748/iso-22090-1-2014>

4.9.1 The THD shall provide interface facilities which meet the relevant International Standards IEC 61162-1 and/or IEC 61162-2 as amended.

4.9.2 The THD equipment shall provide an appropriate data source and at least one output of heading information, which is able to comply with the IEC 61162-2. The IEC 61162-2 heading output shall be updated at a rate of once per 20 ms. The THS sentence detailed in IEC 61162-1 shall be provided for heading information.

5 Accuracy

5.1 General

The THD shall meet at least the following accuracy at the output of the device under sea conditions as specified in IMO Resolution A.424(XI) or A.821(19) as applicable.

5.2 Accuracy of transmission data

The transmission error, including the resolution error, shall be less than $\pm 0,2^\circ$.

1) The term of "Alarm" was replaced by "Alert" in accordance with IMO Resolution MSC.252(83) and IMO Resolution MSC.302(87).