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Ships and marine technology — Manoeuvring of ships —

Part 2: Turning and yaw checking

Navires et technologie maritime — Manoeuvres des navires —

Partie 2: Giration et contrôle de lacet

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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).

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).

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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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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 13643-2:2013), of which it constitutes a minor revision with the following changes:

— Formula (3) has been changed from "$w = w_A + x_A p - y_A p$" to "$w = w_A + x_A q - y_A p$";

— in 12.2, Paragraph 3, $\left(\Delta\psi_E > 60°\right)$ has been changed to $\left(\Delta\psi_E < 60°\right)$ and $\left(\Delta\psi_E < 60°\right)$ to $\left(\Delta\psi_E > 60°\right)$;

— in 12.3, Paragraph 3, $\left(\Delta\psi_E > 240°\right)$ has been changed to $\left(\Delta\psi_E < 240°\right)$ and $\left(\Delta\psi_E < 240°\right)$ to $\left(\Delta\psi_E > 240°\right)$.

A list of all parts in the ISO 13643 series can be found on the ISO website.

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Ships and marine technology — Manoeuvring of ships —

Part 2: Turning and yaw checking

1 Scope

This document defines symbols and terms and provides guidelines for the conduct of tests to give evidences about the turning ability and the yaw containment of surface ships, submarines, and models. It is intended that it be read in conjunction with ISO 13643-1.

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.

ISO 13643-1:2017, *Ships and marine technology — Manoeuvring of ships — Part 1: General concepts, quantities and test conditions*

ISO 80000-1, *Quantities and units — Part 1: General*

ISO 80000-3, *Quantities and units — Part 3: Space and time*

3 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
turning circle test
manoeuvring test to determine the ship's turning characteristics due to application of manoeuvring devices during the period of transient motion and the ensuing steady turn depending on initial speed, manoeuvring device angle or equivalent, and direction of turn

3.2
accelerating turn test
manoeuvring test to determine the ship's behaviour when accelerating from stand-still and simultaneously applying the manoeuvring devices hard over

3.3
thruster turning test
manoeuvring test to determine the capability to turn a ship at zero speed by using its thrusters and to determine the limiting speed at which no more turning effect from bow thrusters can be obtained

Note 1 to entry: This test is relevant to all types and arrangements of tunnel or azimuth thrusters. However, dynamic positioning or traversing tests are beyond the scope of this document.

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3.4
zig-zag test
manoeuvring test to determine the ship's turning and yaw checking ability depending upon initial speed, the amount of manoeuvring devices effect applied, and execute change of heading at which the manoeuvring device is applied in the opposite direction (execute change of heading)

3.5
course change test
manoeuvring test to determine the ship's capability to change heading by a given angle by use of the manoeuvring devices

3.6
parallel track test
manoeuvring test to determine the behaviour of the ship steering to a parallel track by applying manoeuvring devices and subsequently applying the manoeuvring devices in the opposite sense

3.7
person overboard test
manoeuvring test to determine the change of heading at which the ship is steered back to the reciprocal of its initial track by applying manoeuvring devices hard over

3.8
manoeuvring device
rudder, azimuthing thruster, hydroplane, cycloidal propeller, or equivalent system used to manoeuvre a vessel

3.9
hard over
application of the manoeuvring devices to their maximum designed effect

4 Test-related physical quantities

Test-related physical quantities are listed in Table 1. The more general quantities and concepts concerning the manoeuvring of ships are set out in ISO 13643-1.

For quantities and their units, ISO 80000-1 and ISO 80000-3 shall be used.

Table 1 — Test-related physical quantities

Symbol	CC-code	SI-unit	Concept	
			Term	Definition or explanation
D_c	DC	m	Steady turning diameter	Diameter of ship's track relative to the water once a steady turn is established
P			Port (side)	—
P_{EX}	EXP	—	Extreme point	Point of the after part of the vessel which, during the steady turn, describes the path with the greatest diameter relative to the water
p	OMX	rad s^{-1} [a]	Roll velocity	(See ISO 13643-1)
q	OMY	rad s^{-1} [a]	Angular velocity about y-axis	(See ISO 13643-1)
r	OMZ	rad s^{-1} [a]	Angular velocity about z-axis	(See ISO 13643-1)
S			Starboard (side)	—
s_{10}	SP10	m	Track reach for 10° change of heading	Distance along the ship's track at $\Delta\psi$ = 10° (usually only for δ_{Ri} = 10°)
T	TIP	s	Time of complete cycle	See Figure 5

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