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Maritime navigation and radiocommunication equipment and systems – Track control systems – Operational and performance requirements, methods of testing and required test results

Matériels et systèmes de navigation et de radiocommunication maritimes – Systèmes de contrôle de route – Exigences opérationnelles et de fonctionnement, méthodes d'essai et résultats exigibles



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Maritime navigation and radiocommunication equipment and systems – Track control systems – Operational and performance requirements, methods of testing and required test results

Matériels et systèmes de navigation et de radiocommunication maritimes – Systèmes de contrôle de route – Exigences opérationnelles et de fonctionnement, méthodes d'essai et résultats exigibles

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**MARITIME NAVIGATION AND
RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS –
TRACK CONTROL SYSTEMS –****Operational and performance requirements,
methods of testing and required test results**

FOREWORD

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International Standard IEC 62065 has been prepared by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

This second edition cancels and replaces the first edition published in 2002 and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- alarms and warnings have been brought into line with the requirements for Bridge Alert Management;
- requirements for the category B system have been revised;

- the parameters of the ship models of Annex I have been adjusted to resemble more Newtonian-like behaviour and the tidal current has been modelled;
- a new Annex K has been added with interface requirements.

This bilingual version (2017-09) corresponds to the monolingual English version, published in 2014-02.

The text of this standard is based on the following documents:

FDIS	Report on voting
80/716/FDIS	80/729/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

All text of this standard that is identical to that in IMO resolution MSC.74(69), Annex 2, is printed in *italics* and the resolution (abbreviated to – A2) and paragraph numbers are indicated in brackets i.e. (A2/3.3).

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – TRACK CONTROL SYSTEMS –

Operational and performance requirements, methods of testing and required test results

1 Scope

This International Standard specifies the minimum operational and performance requirements, methods of testing and required test results conforming to performance standards adopted by the IMO in resolution MSC.74(69) Annex 2 Recommendation on Performance Standards for Track Control Systems. In addition, it takes into account IMO resolution A.694(17) to which IEC 60945 is associated.

When a requirement of this standard is different from IEC 60945, the requirement in this standard takes precedence. Also it takes into account IMO resolution MSC.302(87) on bridge alert management (BAM).

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.

IEC 60945, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61162 (all parts), *Maritime navigation and radiocommunication equipment and systems – Digital interfaces*

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 – Part 2: Modular structure for INS – Operational and performance requirements, methods of testing and required test results*

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*

IEC 62616, *Maritime navigation and radiocommunication equipment and systems – Bridge navigational watch alarm system (BNWAS)*

IMO MSC.74(69) Annex 2, *Recommendation on Performance Standards for Track Control Systems*

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 MSC.302(87), *Performance standards for bridge alert management (BAM)*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

3.1.1

active track

track activated for track control

3.1.2

alarm

high-priority alert

Note 1 to entry: Condition requiring immediate attention and action by the bridge team, to maintain the safe navigation of the ship.

3.1.3

alert

announcement of abnormal situations and conditions requiring attention

Note 1 to entry: Alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions.

Note 2 to entry: Alerts are additionally classified in two different categories for navigational purposes: category A and category B as described in IMO resolution MSC.302(87).

Note 3 to entry: An alert provides information about a defined state change in connection with information about how to announce this event in a defined way to the system and the operator.

3.1.4

along-track speed control

automatic control of the ship's speed during track control based on a pre-planned track

3.1.5

assisted turn

manoeuvre of a ship automatically controlled by a pre-set radius or rate of turn but not based on the ship's position to perform an approximation of a curved track

3.1.6

back-up navigator

any individual, generally an officer, who has been designated by the ships master to be on call if assistance is needed on the bridge

3.1.7

back-up navigator alarm

signal automatically sent from the TCS to call assistance to the bridge when the officer of the watch fails to acknowledge certain alarms within a defined time period

Note 1 to entry: Note that the back-up navigator alarm does not represent an alarm as defined in 3.1.2.

3.1.8

consistent common reference system

sub-system or function of a TCS for acquisition, processing, storage, surveillance and distribution of data and information providing identical and obligatory reference to sub-

systems and subsequent functions within a TCS and to other connected equipment, if available

3.1.9 course

for marine navigation, horizontal direction in which a vessel is steered or intended to be steered, expressed as angular distance from north, usually 000° at north, clockwise through 360°

Note 1 to entry: 360° is indicated as 000°.

3.1.10 course difference limit

maximum difference between track course and heading before a warning is activated

3.1.11 cross-track distance

cross-track error

perpendicular distance of a predefined point on the ship from the track including direction (negative if the ship is left of the intended track)

3.1.12 cross-track limit

maximum cross-track distance before an alarm is activated

3.1.13 curved track

non-straight track between two legs

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3.1.14 fall-back arrangements

automatic reaction of the TCS by using data, function or hardware of degraded quality in relation to the failed one

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EXAMPLE Dead reckoning for position information, heading control in case of a failure of track control.

3.1.15 FROM-waypoint

last passed waypoint

3.1.16 great circle sailing

sailing on the intersection of the earth surface and a plane containing the points A, B and the centre of the sphere

3.1.17 heading

horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000° at the reference direction clockwise through 360°

Note 1 to entry: 360° is indicated as 000°.

3.1.18 heading control

control of the ship's heading

3.1.19

heading monitor function

monitoring of the actual heading sensor by an independent second source

3.1.20

leg

straight line between two waypoints and/or curved track(s)

3.1.21

main conning position

place on the bridge with a commanding view providing the necessary information and equipment for the conning officer to carry out his functions

3.1.22

minimum manoeuvring speed for track control

lowest fore/aft speed through the water at which the track control system is capable of maintaining its performance within the specified accuracy limits

Note 1 to entry: The value depends on the ship's design and loading and on the present environmental conditions.

3.1.23

NEXT-waypoint

waypoint following the TO-waypoint

3.1.24

override facility

control to perform the override function

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3.1.25

override function

intentional fast change-over from automatic to temporary manual control

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3.1.26

position monitor function

monitoring of the actual position sensor by an independent second source

3.1.27

primary position-fixing system

electronic position-fixing system (EPFS) used for track control and approved by the International Maritime Organization (see 5.1.1.3)

3.1.28

radius of turn

radius of a curved track

3.1.29

rate of turn

change of heading per time unit

3.1.30

rhumb line sailing

sailing on a line on the surface of the earth making the same angle with each meridian crossed

3.1.31

ship manoeuvring characteristics

range-of-manoeuvre possible for the ship

Note 1 to entry: Examples of the range-of-manoeuvres are: maximum rate of turn, minimum radius of turn, maximum turn acceleration and deceleration.

3.1.32

single operator action

procedure achieved by no more than one hard-key or soft-key action, excluding any necessary cursor movements, or voice actuation using programmed codes

3.1.33

speed

absolute value of velocity

Note 1 to entry: May either be the ship's speed through the water, or the speed made good over the ground.

3.1.34

steering mode selector

switch provided for the selection of manual steering modes and automatic steering devices

3.1.35

surge

forward component of ship motion

3.1.36

sway

athwartships component of ship motion (positive to starboard)

3.1.37

temporary track

track that originates at the current position of the ship and joins the pre-planned track

[IEC 62065:2014](http://standards.iteh.ai/standards/iec/62065-2014)

Note 1 to entry: The temporary track may include temporary waypoints which can be identified as different from the waypoints of the pre-planned track. <http://standards.iteh.ai/standards/iec/62065-2014>

3.1.38

TO-waypoint

waypoint which the ship is approaching

3.1.39

track

path to be followed over ground

3.1.40

track control

control of the ship's movement along a track, where corrections made by the controller to compensate for wind, drift and other influences, are based on the cross-track error and not only on the bearing to the destination waypoint (TO-waypoint)

3.1.41

track course

direction from one waypoint to the next, a constant course on a rhumb line track and a varying course on a Great Circle track

3.1.42

warning

alert for condition requiring immediate attention, but no immediate action by the bridge team

Note 1 to entry: Warnings are presented for precautionary reasons to make the bridge team aware of changed conditions which are not immediately hazardous, but may become so if no action is taken.

3.1.43

waypoint

geographic position together with its associated data

3.1.44

wheel-over-line

WOL

line where the ship has to initiate a curved track to eliminate the effect of any offset with respect to the new course, taking into consideration the distance required for the ship to build up the necessary rate of turn

3.1.45

wheel-over-time

WOT

point in time when the track control system initiates the planned course change

3.1.46

yaw

rate of turn (positive to starboard)

3.2 Abbreviations

~A	Not applicable for category A systems
ACCA	Actual course change alarm
ACCW	Actual course change warning
BAM	Bridge alert management
CCRP	Consistent common reference point
CCRS	Consistent common reference system
COG	Course over ground
DGPS	Differential GPS
DR	Dead reckoning
ECCA	Early course change alarm
ECCW	Early course change warning
ENC	Electronic navigational chart
EPFS	Electronic position fixing system
EUT	Equipment under test
GC	Great circle
GPS	Global positioning system
INS	Integrated navigation system
NA	(Back up) Navigator alarm
RL	Rhumb line
ROT	Rate-of-turn
SDME	Speed and distance measuring equipment
SWH	Significant wave height
TCS	Track control system
WOL	Wheel-over-line
WOT	Wheel-over-time

4 Application of this standard

The application of this standard is as follows.

- a) (A2/1) *Track control systems in conjunction with their sources of position, heading and speed information are intended to keep a ship automatically on a pre-planned track over ground under various conditions and within the limits related to the ship's manoeuvrability. A track control system may additionally include or be combined with*
- heading control;
 - along-track speed control (see Annex B).
- b) Planning the track by waypoints may be performed
- as part of the track control system, or
 - by importing waypoint or track data.
- c) The track control system shall ensure the integrity of the geodetic datum, the ship manoeuvring characteristics and the curved tracks of the imported data.
- d) This standard applies for track control systems which can exchange data with a heading sensor, speed sensor, EPFS and/or heading controller but excludes waypoint data exchange.
- e) If a track control system automatically receives additional data, including waypoints, from other navigational aids, the requirements of IEC 61924-2 for this data exchange shall also apply.
- f) If a track control system is integrated into an INS, the corresponding requirements of INS (as defined in IEC 61924-2) shall apply, for example concerning
- route planning by waypoints,
 - data transfer of safety-checked waypoints and
 - monitoring of navigational safety for example by charts.
- g) Track control does not necessarily require that ENC or other geographic data such as shallow area information be taken into consideration by the track control system.
- h) (A2/2.1) *These IMO Performance Standards are applicable for track control systems working*
- IEC 62065:2014
https://standards.iteh.ai/catalog/standards/sist/d6dca6ae-ac24-42b4-a0f6-23324b599b2e/iec-62065-2014
- at ship's speed from minimum manoeuvring speed up to 30 kn; and
 - at ship's maximum rate of turn not greater than 10°/s.
- i) These performance standards do not apply to High Speed Craft as defined by SOLAS chapter 10.
- j) (A2/2.2) *Track control systems fitted on ships shall meet all requirements of the IMO Performance Standards (MSC.74(69) Annex 2 Recommendation on Performance Standards for Track Control Systems) relating to straight tracks.*
- k) *Systems fitted on ships requiring curved track control shall additionally meet all the requirements relating to curved tracks (category C).*
- l) This standard applies to three categories of track control systems:
- Category A: Single leg track control or multiple leg track control without assisted turns between legs;
 - Category B: Multiple leg track control with assisted turns between legs;
 - Category C: Full track control on legs and turns.

Some requirements contained in this clause cannot be verified by objective measurements. The manufacturer shall declare that compliance to these requirements is achieved and shall provide relevant documentation. The declaration(s), documentation and, where necessary, the equipment shall be checked. The manufacturer shall also declare the general hardware and functional composition of the equipment and the relevant category of IEC 60945 for each unit.