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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. It was developed in cooperation with ISO TC8 SC6.

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

FDIS	Report on voting
80/331/FDIS	80/339/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annexes A, G and I form an integral part of this standard.

Annexes B, C, D, E, F, H and J are for information only.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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 Recommendations on Performance Standards for Track Control Systems. In addition it takes into account IMO resolution A.694 to which IEC 60945 is associated. When a requirement of this standard is different from IEC 60945, the requirement in this standard shall take precedence.

NOTE 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).

2 Normative references

The following referenced documents are indispensable for the application 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, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61108-1, *Global navigation satellite systems (GNSS) – Part 1: Global positioning system (GPS) – Receiver equipment – Performance standards, methods of testing and required test results*

IEC 61108-2, *Maritime navigation and radiocommunication equipment and systems – Global navigation satellite systems (GNSS) – Part 2: Global navigation satellite system (GLONASS) Receiver equipment – Performance standards, methods of testing and required test results*

IEC 61162-1, *Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 1: Single talker and multiple listeners*

IEC 61162-2, *Maritime navigation and radio communication equipment and systems – Digital interfaces – Part 2: Single talker and multiple listeners, high speed transmission*

ISO 9000, *Quality management and quality assurance standards*

IMO Resolution A.694(17), *General requirements for shipborne radio equipment performing part of the GMDSS and for electronic navigational aids*

IMO Resolution A.830(19), *Code on alarms and indicators*

IMO MSC.74(69) Annex 2, *Recommendations on performance standards for Track control systems*

3 Definitions and abbreviations

For the purposes of this standard, the following definitions and abbreviations apply.

3.1 Definitions

3.1.1
active track
track activated for track control

3.1.2
alarm
audio and visual signal announcing a condition requiring attention. The audio continues until acknowledged. The acoustic noise pressure of the alarm is at least 75 dBA but not greater than 85 dBA at a distance of 1 m (IEC 60945). The visual indication continues until the alarm condition is removed

3.1.3
along track speed control
automatic control of the ship's speed during track control based on a pre-planned track

3.1.4
assisted turn
manoeuvre of a ship from one straight leg to the next automatically controlled by a pre-set radius or rate of turn but not based on the ship's position

3.1.5
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

3.1.6
consistent common reference system
sensor input data, providing identical and obligatory reference pertaining to position, course, heading, bearing, speed, velocity, etc. and horizontal datum to different sub-systems within an integrated navigation system

3.1.7
course
for marine navigation, course is the 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°.[1]

3.1.8
course difference limit
maximum difference between track course and heading before an alarm is activated

3.1.9
cross track distance **(also known as cross track error)**
perpendicular distance of the ship from the track including direction (negative if the ship is left of the intended track)

3.1.10
cross-track limit
maximum cross track distance before an alarm is activated

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[1] 360° is indicated as 000°.

3.1.11
curved track
non-straight track between two straight legs

3.1.12
fall-back arrangements
automatic reaction of the system to a failure to provide the best possible functionality

3.1.13
FROM-waypoint
the last passed waypoint

3.1.14
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

3.1.15
heading
the 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° [2]

3.1.16
heading control
control of the ship's heading

3.1.17
***heading monitor* function**
Monitoring the actual heading sensor by an independent second source

3.1.18
indication
visual display of any message to the user which may be accompanied by a low intensity acoustic signal to gain attention

3.1.19
leg
line between two waypoints defining the track

3.1.20
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

3.1.21
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. The value depends on the ship's design and loading and on the present environmental conditions

3.1.22
NEXT-waypoint
the waypoint following the TO-waypoint

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[2] 360° is indicated as 000°.

3.1.23
override facility
a control to perform the override function

3.1.24
override function
an intentional fast change-over from automatic to temporary manual control

3.1.25
***position monitor* function**
monitoring the actual position sensor by an independent second source

3.1.26
primary position-fixing system
electronic position-fixing system (EPFS) used for track control and approved by the International Maritime Organization (see 4.1.1.3)

3.1.27
radius of turn
radius of a curved track

3.1.28
rate of turn
change of heading per time unit

3.1.29
rhumb line sailing
sailing on a line on the surface of the earth making the same angle with each meridian crossed

3.1.30
ship manoeuvring characteristics
these define the range-of-manoeuvre possible for the ship (for example, maximum turn rate, minimum turn radius, maximum turn acceleration and deceleration)

3.1.31
single operator action
an action which is directly accessible and immediately effected, for example by:

– dedicated controls;
– primary access in an associated menu;
– alternative solutions which meet the functional requirements

3.1.32
speed
the absolute value of velocity. May either be the ship's speed through the water, or the speed made good over the ground

3.1.33
steering mode selector
a switch provided for the selection of manual steering modes and automatic steering devices

3.1.34
temporary track
a track that originates at the current position of the ship and joins the pre-planned track. The temporary track may include temporary waypoints which can be identified as different from the waypoints of the pre-planned track

3.1.35
TO-waypoint
the waypoint which the ship is approaching

3.1.36
track
path to be followed over ground

3.1.37
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)

3.1.38
track course
the direction from one waypoint to the next, a constant course on a rhumb line track and a varying course on a Great Circle track

3.1.39
track planning
preplanning of a track including waypoint data and optionally speed data, commonly referred to as passage planning or voyage planning

3.1.40
waypoint
a geographic position together with its associated data

3.1.41
wheel-over-line
the line, for example, perpendicular to the course 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 turn rate

3.2 Abbreviations

~A	Not applicable for category A systems
CCA	Course change alarm
CCI	Course change indication
DGPS	Differential GPS
DR	Dead reckoning
ECCI	Early course change indication
ENC	Electronic navigational chart
EPFS	Electronic position fixing system
EUT	Equipment under test
GC	Great circle
GLONASS	Russian Ministry of Defence global navigation satellite system
GPS	Global positioning system
HSC	High speed craft
INS	Integrated navigation system
NA	(Back up) Navigator alarm
RL	Rhumb line
SDME	Speed and distance measuring equipment
WOT	Wheel-over time

4 Requirements and application of this standard

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) 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.

d) If a track control system automatically receives additional data, including waypoints, from other navigational aids, the requirements of IEC 61924 for this data exchange shall also apply.

e) If a track control system is integrated into an INS, the corresponding requirements of INS (as defined in IEC 61924), for example concerning

   – track planning by waypoints,

   – data transfer of safety-checked waypoints and

   – monitoring of navigational safety for example by charts

   shall apply.

f) 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.

g) (A2/2.1) *These* IMO *Performance Standards are applicable for track control systems working*

   – *at ship's speed from minimum manoeuvring speed up to 30 knots; and*

   – *at ship's maximum rate of turn not greater than 10°/s.*

h) These performance standards do not apply to HSC as defined by SOLAS chapter 10.

i) (A2/2.2) *Track control systems fitted on ships* shall *meet all requirements of the* IMO *Performance Standards* (MSC.74(69) Annex 2 Recommendations on Performance Standards for Track Control Systems) *relating to straight tracks. Systems fitted on ships requiring curved track control* shall *additionally meet all the requirements relating to curved tracks.*

j) This standard applies to three categories of track control systems:

   Category A: Single straight leg track control or multiple straight leg track control without assisted turns between legs;

   Category B: Multiple straight leg track control with assisted turns between legs;

   Category C: Full track control on straight legs and turns.

k) 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.