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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR) – Part 1: Performance requirements, methods of testing and required test results

Matériels et systèmes de navigation et de radiocommunication maritimes – Enregistreur de données de navigation embarqué (VDR) – Partie 1: Exigences de fonctionnement, méthodes d'essai et résultats d'essai exigés

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MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – SHIPBORNE VOYAGE DATA RECORDER (VDR) –

Part 1: Performance requirements, methods of testing and required test results

FOREWORD

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International Standard IEC 61996-1 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 2007 and constitutes a technical revision.

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

a) The description of the protective capsule in 4.3.4 has been changed in line with the requirements of the new IMO performance standards given in Resolution MSC.333(90) which now require a final recording medium comprising three parts; fixed, float-free and long-term.

b) A new requirement for a performance test has been added in 4.3.6.

c) Further data items to be recorded have been added to 4.6 for ECDIS, AIS, rolling motion and electronic logbooks.

d) Clause 5 contains new technical requirements for configuration data, operational performance test and bridge alert management system. In addition, further technical requirements have been added to 5.6 for bridge audio and to 5.8 for radar and ECDIS images.

e) References to “alarm” requirements in the previous edition have been substituted by references to “cautions” in line with current IMO recommendations. The test methods in Clause 6 have been updated to reflect the new requirements.

f) New Annexes E, F and G concerning protocols for interfacing images using a Local Area Network have been added.

This bilingual version (2017-06) corresponds to the English version, published in 2013-05.

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

FDIS	Report on voting
80/690/FDIS	80/699/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.

A list of all parts of the IEC 61996 series, under the general title *Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR)*, can be found on the IEC website.

NOTE All text of this standard, whose wording is identical to that of IMO Resolution MSC.333(90), is printed in *italics*, and the Resolution and associated performance standard paragraph numbers are indicated in brackets.

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

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

MARITIME NAVIGATION AND RADIOCOMMUNICATION EQUIPMENT AND SYSTEMS – SHIPBORNE VOYAGE DATA RECORDER (VDR) –

Part 1: Performance requirements, methods of testing and required test results

1 Scope

This part of IEC 61996 specifies the minimum performance requirements, technical characteristics, methods of testing and required test results, for shipborne voyage data recorder (VDR) installations as required by Chapter V of the International Convention for Safety of Life at Sea (SOLAS), as amended. It takes account of IMO resolution A.694(17) and is associated with IEC 60945. When a requirement in this standard is different from IEC 60945, the requirement in this standard takes precedence.

This standard incorporates the applicable parts of the performance standards included in IMO Resolution MSC.333(90).

NOTE All text of this standard, whose wording is identical to that of IMO Resolution MSC.333(90), is printed in *italics,* and the Resolution and associated performance standard paragraph numbers are indicated in brackets.

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 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60268-16, *Sound system equipment – Part 16: Objective rating of speech intelligibility by speech transmission index*

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

IEC 61097-2, *Global maritime distress and safety system (GMDSS) – Part 2: COSPAS-SARSAT EPIRB – Satellite emergency position indicating radio beacon operating on 406 MHz – Operational and performance requirements, methods of testing and required test results*

IEC 61097-7:1996, *Global maritime distress and safety system (GMDSS) – Part 7: Shipborne VHF radiotelephone transmitter and receiver – Operational and performance requirements, methods of testing and required test results*

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

IEC 61162-450:2011, *Maritime navigation and radiocommunication equipment and systems – Digital interfaces – Part 450: Multiple talkers and multiple listeners – Ethernet interconnection*

IEC 61174, *Maritime navigation and radiocommunication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results*

IEC 61260:1995, *Electroacoustics – Octave-band and fractional-octave-band filters*
Amendment 1:2001

IEC 61672-1:2002, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 62388:2007, *Maritime navigation and radiocommunication equipment and systems – Shipborne radar – Performance requirements, methods of testing and required test results*

IMO A.658(16), *Use and fitting of retro-reflective materials on life-saving appliances*

IMO A.662(16), *Performance standards for float-free release and activation arrangements for emergency radio equipment*

IMO 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 A.810(19), *Performance standards for float-free satellite emergency position-indicating radio beacons (EPIRBs) operating on 406 MHz*

IMO A.1021(26), *Code on alerts and indicators*

IMO MSC.333(90):2012, *Performance standards for shipborne Voyage Data Recorders (VDRs)*

EUROCAE ED-112:2003, *Minimum operational performance specification (MOPS) for crash protected airborne recorder systems*

VESA:2007, *Video electronics standards association – VESA and industry standards and guidelines for computer display monitor timing (DMT), Version 1.0, Revision 0.11*

SAE AS8045A:2011, *Engineering Society for advancing mobility land sea air and space – Minimum performance standard for underwater locating devices – Acoustic, self-powered*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
alert
announcement of abnormal situations and conditions requiring attention. Alerts are divided in four priorities: emergency alarms, alarms, warnings and cautions

Note 1 to entry: See (A.1021(26)/3).

3.1.2
alarm
high priority of an alert. A condition requiring immediate attention and action, to maintain the safe navigation and operation of the ship

Note 1 to entry: See (A.1021(26)/3).

3.1.3
bridge work station
position at which a person is expected to be when performing one of the normal bridge duties at, for example, the following work stations:

- centre line conning;
- bridge wing(s);
- main radar;
- chart table;
- helmsman;
- communication

3.1.4
caution
lowest priority of an alert. A condition which does not warrant an alarm or warning condition, but still requires attention and out of the ordinary consideration of the situation or of given information

Note 1 to entry: A caution is indicated by a steady visual indication with a message of sufficient detail to enable the bridge team to identify and address the caution condition. No acknowledgement is required and the caution should be automatically removed after the condition is rectified.

Note 2 to entry: See (A.1021(26)/3).

3.1.5
combined EPIRB/VDR capsule
single unit which meets all the requirements of a satellite EPIRB (as required by the carriage requirements of SOLAS IV) and all the requirements of a VDR (as required by the carriage requirements of SOLAS V)

Note 1 to entry: Combined EPIRB/VDR capsule was defined by IMO COMSAR 8.

3.1.6
configuration data
describes the vessel's equipment, its installation on the vessel and its relation to the VDR. The storage and playback software uses this data to store the data record and to convert the data record into information that assists casualty investigation during playback

Note 1 to entry: See (MSC.333(90)/4.10).

3.1.7
data
any item of information received by the VDR for recording, including numerical values, text and audio or radar signals and including all configuration data, except where specifically stated or where the context dictates otherwise

3.1.8
dedicated reserve power source
a battery, with suitable automatic charging arrangements, dedicated solely to the VDR, of sufficient capacity to operate it as required by 5.4.2

Note 1 to entry: See (MSC.333(90)/4.9).

3.1.9
final recording medium
the items of hardware on which the data is recorded such that access to any one of them would enable the data to be recovered and played back by use of suitable equipment. The combination of a fixed recording medium and float-free recording medium and long-term recording medium, together, is recognized as the final recording medium

Note 1 to entry: See (MSC.333(90)/4.3).

3.1.10
fixed recording medium
part of the Final Recording Medium which is protected against fire, shock, penetration and a prolonged period on the ocean floor. It is expected to be recovered from the deck of the vessel that has sunk. It has a means of indicating location

Note 1 to entry: See (MSC.333(90)/4.4).

3.1.11
float-free recording medium
part of the Final Recording Medium which should float-free after a sinking. It has a means of indicating location

Note 1 to entry: See (MSC.333(90)/4.5).

3.1.12
long-term recording medium
permanently installed part of the Final Recording Medium. It provides the longest record duration and has a readily accessible interface for downloading the stored data

Note 1 to entry: See (MSC.333(90)/4.6).

3.1.13
playback equipment
any data medium with the playback software, the operational instructions and any special parts required for connecting a commercial-off-the-shelf laptop computer to the VDR

Note 1 to entry: See (MSC.333(90)/4.7).

3.1.14
playback software
copy of the software program to provide the capability to download the stored data and play back the information. The software should be compatible with an operating system available with commercial-off-the-shelf laptop computers and where non-standard or proprietary formats are used for storing the data in the VDR, the software should convert the stored data into open industry standard formats

Note 1 to entry: See (MSC.333(90)/4.8).

3.1.15
playback system
system including the playback equipment that is capable of downloading and playing back the recorded data

3.1.16
recorder
VDR
complete system, including any items required to interface with the sources of input signals, their processing and encoding, the final recording medium, the playback equipment, the power supply and dedicated reserve power source

Note 1 to entry: See (MSC.333(90)/4.1).

3.1.17
resolution
smallest detectable increment between two values

3.1.18
signal source
any sensor or device external to the VDR, to which the VDR is connected and from which it obtains signals and data to be recorded

Note 1 to entry: See (MSC.333(90)/4.2*)*.

3.2 Abbreviations

EPFS	Electronic position-fixing system
EUT	Equipment under test
FFT	Fast Fourier Transform
GMDSS	Global maritime distress and safety system
IMO	International Maritime Organization
INS	Integrated navigation system
ITU	International Telecommunication Union
LAN	Local area network
ROV	Remotely operated vehicle
SAR	Search and rescue
SINAD	Signal to noise and distortion
SPL	Sound pressure level
STI	Speech transmission index
STIPA	Speech transmission index for public address systems
UTC	Coordinated universal time
VHF	Very high frequency

4 Performance requirements

4.1 General

Performance requirements described in this clause are specified by reference to the numbered paragraphs of IMO Resolution MSC.333(90).

4.2 Purpose

(MSC.333(90)/1) *The purpose of a Voyage Data Recorder (VDR) is to maintain a store, in a secure and retrievable form, of information concerning the position, movement, physical status, command and control of a vessel over the period leading up to, and following, an incident having an impact thereon. Information contained in a VDR* shall *be made available to both the Administration and the shipowner. This information is for use during any subsequent safety investigation to identify the cause(s) of the incident.*

4.3 Operational requirements

4.3.1 Design and construction

(See 6.1.5)

(MSC.333(90)/5.1.4) *The design and construction, which* shall *be in accordance with the requirements of resolution A.694(17) and international standards acceptable to the*

International Maritime Organization (IMO), shall *take special account of the requirements for data security and continuity of operation as detailed in* 4.4 and 4.5.

4.3.2 Maintenance of sequential records

(See 6.1.11)

(MSC.333(90)/5.1.1) *The VDR* shall *continuously maintain sequential records of pre-selected data items relating to the status and output of the ship's equipment, and command and control of the ship, referred to in 4.6*.

4.3.3 Co-relation in date and time

(See 6.1.12)

(MSC.333(90)/5.1.2, 5.5.1) *To permit subsequent analysis of factors surrounding an incident, the method of recording* shall *ensure that the various data items can be co-related in date and time during playback on suitable equipment.*

The recording method shall *be such that the timing of all recorded data items can be derived on playback with a resolution sufficient to reconstruct the history of an incident in detail* (see 4.6.1).

4.3.4 Final recording medium

4.3.4.1 Items of final recording medium

4.3.4.1.1 General

(MSC.333(90)/5.2) *The final recording medium* shall *consist of the following items:*

1) *Fixed recording medium;*
2) *Float-free recording medium; and*
3) *Long-term recording medium.*

4.3.4.1.2 Fixed recording medium

(See 6.1.13)

(MSC.333(90)/5.2.1) *The fixed recording medium* shall *be installed in a fixed protective capsule which* shall *meet all of the following requirements:*

1) *be capable of being accessed following an incident but secure against a physical or electronically manipulated change or deletion of recorded data;*
2) *maintain the recorded data for a period of at least 2 years following termination of recording;*
3) *maximize the probability of survival against fire, shock, penetration and deep-sea-pressure and recovery of the final recorded data after any incident;*
4) *be of a highly visible colour and marked with retro-reflective materials; and*
5) *be fitted with an appropriate device to aid location under water.*

4.3.4.1.3 Float-free recording medium

(See 6.1.14)

(MSC.333(90)/5.2.2) *The float-free recording medium* shall *be installed in a float-free capsule which* shall *meet all of the following requirements:*

1) *be fitted with means to facilitate grappling and recovery;*