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SPECIFICATION

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PAS 61996-2

Pre-Standard

First edition
2005-07

**Maritime navigation and radiocommunication
equipment and systems –
Shipborne voyage data recorder (VDR) –**

**Part 2:
Simplified voyage data recorder (S-VDR) –
Performance requirements –
Methods of testing and required test results**

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CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope	6
2 Normative references	6
3 Terms, definitions and abbreviations	7
3.1 Terms and definitions	7
3.2 Abbreviations	8
4 Performance requirements.....	9
4.1 General.....	9
4.2 Purpose	9
4.3 Operational requirements.....	10
4.4 Data selection and security.....	12
4.5 Continuity of operation.....	13
4.6 Data items to be recorded.....	14
5 Technical characteristics	16
5.1 Co-relation in date and time.....	16
5.2 Particular design requirements for the protective capsule.....	16
5.3 Location beacon(s) for the protective capsule.....	17
5.4 Survivability of recorded data.....	18
5.5 Information to be included in the manufacturer's documentation	19
5.6 Bridge audio specifications.....	20
5.7 Communications audio.....	21
5.8 Radar data – Post-display selection.....	21
6 Methods of testing and required test results	22
6.1 General.....	22
6.2 Data items to be recorded.....	29
Annex A (informative) IEC 61162 sentence formats	46
Annex B (informative) Mandatory alarms	47
Annex C (informative) Requirement/test – Cross-references	49
Annex D (informative) Cross-references between VDR and S-VDR	51
Bibliography	52

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 2: Simplified voyage data recorder (S-VDR) –
Performance requirements –
Methods of testing and required test results**

FOREWORD

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IEC-PAS 61996-2 has been processed by IEC technical committee 80: Maritime navigation and radiocommunication equipment and systems.

The text of the PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document:

Draft PAS	Report on voting
80/401/NP-PAS	80/406/RVN

Following publication of this PAS, the technical committee or subcommittee concerned will investigate the possibility of transforming the PAS into an International Standard.

IEC 61996 consists of the following parts, under the general title *Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR)*:

Part 1: Performance requirements – Methods of testing and required test results (currently available as IEC 61996:2000)

Part 2: Simplified voyage data recorder (S-VDR) – Performance requirements – Methods of testing and required test results

This PAS shall remain valid for an initial maximum period of three years starting from 2005-07. The validity may be extended for a single 3-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

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INTRODUCTION

This document is issued as an IEC Publicly Available Specification according to the IEC/PAS approval process. This agreed process allows the new information needed to implement the simplified voyage data recorder (S-VDR) to be placed in the public domain in a shorter time-scale than revising the appropriate International Standards.

The S-VDR has been introduced by the IMO for fitting to existing ships as a simplified alternative to the voyage data recorder (VDR) which is required for all new ships.

This document provides information on the testing requirements for S-VDR as defined in IMO performance standard MSC.163(78).

The specification for S-VDR differs significantly from that for VDR in two areas:

- a) the requirements for monitoring certain sensors are reduced when the data is not provided in IEC 61162 format;
- b) the requirements for the protective S-VDR capsule are different from the VDR capsule, both for the fixed and float-free versions.

Annex D provides a cross-reference between this document and IEC 61996 to aid test houses which may already have test results for VDRs which are being submitted as S-VDRs.

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WITHDRAWN

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

Part 2: Simplified voyage data recorder (S-VDR) – Performance requirements – Methods of testing and required test results

1 Scope

This PAS specifies the minimum performance requirements, technical characteristics and methods of testing, and required test results, for simplified shipborne voyage data recorders (S-VDRs) as required by IMO MSC.163(78). It takes into account 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.

NOTE All text of this standard, whose wording is identical to that of IMO MSC.163(78) is printed in *italics*, and the Resolution and associated performance standard paragraph numbers are indicated in brackets.

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 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60268:1998, *Sound system equipment – Part 16: Objective rating of speech intelligibility by speech transmission index*

IEC 60936-1:1999, *Maritime navigation and radiocommunication equipment and systems – Radar – Part 1: Shipborne radar – Performance requirements – Methods of testing and required test results*¹

Amendment 1 (2002)

IEC 60936-3: *Maritime navigation and radiocommunication equipment and systems – Radar – Part 3: Shipborne radar with chart facilities – Methods of testing and required test results*

IEC 60945:2002, *Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results*

IEC 61097-2: 2002, *Global maritime distress and safety system (GMDSS) – Part 2: COSPAS SARTSAT 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 61260: *Electroacoustics – Octave-band and fractional-octave-band filters*

¹ There exists a consolidated edition 1.1 (2002) that includes edition 1.0 and its amendment.

IEC 61672 (all parts), *Electroacoustics – Sound level meters*

IEC 61993-2, *Maritime navigation and radiocommunication equipment and systems – Automatic identification systems (AIS) – Part 2: Class A shipborne equipment of the universal automatic identification systems (AIS) – Operational and performance requirements, methods of test and required test results*

IEC 61996 (all parts), *Maritime navigation and radiocommunication equipment and systems – Shipborne voyage data recorder (VDR)*

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.830(19):1995, *Code on alarms and indicators*

IMO A.861(20): *Performance standards for shipborne voyage data recorders (VDRs)*

IMO MSC.81(70): *Testing of life-saving appliances*

IMO MSC.163(78): *Performance standards for shipborne simplified voyage data recorders (S-VDR).*

Eurocae: ED56A – *Minimum operational performance specification (MOPS) for cockpit voice recorder system*

VESA:1996, *Video electronics standards association – Discrete monitor timings standard 1.0, Revision 0.7 (DMTS)*

SAE AS8045:1988, *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

recorder (S-VDR) (MSC.163(78) 4.1)

complete system, including any items required to interface with the sources of input data, for processing and encoding the data, the final recording medium in its capsule, the power supply and dedicated reserve power source

3.1.2

sensor (MSC.163(78) 4.2)

any unit external to the S-VDR to which the S-VDR is connected and from which it obtains data to be recorded

3.1.3

final recording medium (MSC.163(78) 4.3)

any item of hardware on which the data is recorded such that access to it would enable the data to be recovered and played back by use of suitable equipment

3.1.4

playback equipment (MSC.163(78) 4.4)

any equipment, compatible with the recording medium and the format used during recording, employed for recovering the data. It includes also the display or presentation hardware and software that is appropriate to the original data source equipment. Playback equipment is not normally installed on a ship and is not regarded as part of a S-VDR within this standard

3.1.5

dedicated reserve power source (MSC.163(78) 4.5)

secondary battery, with suitable automatic charging arrangements, dedicated solely to the VDR, of sufficient capacity to operate it as required by 4.5.3

3.1.6

resolution

smallest detectable increment between two values

3.1.7

data

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

3.1.8

activation of a suitable alarm

mutable audible alarm and persistent visual indication, given according to the requirements of A.830(19) and IEC 60945

3.1.9

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
- helms
- communication

3.2 Abbreviations

AIS	Automatic identification system
ALR	IEC 61162 sentence: Set alarm state
DPT	IEC 61162 sentence: Depth relative to the transducer
DTM	IEC 61162 sentence: Geodetic datum reference
EPFS	Electronic position fixing system
EPIRB	Emergency position indicating radio beacon
EUT	Equipment under test

GMDSS	Global maritime distress and safety system
GNS	IEC 61162 sentence: GNSS fix data
GNSS	Global Navigation Satellite System
HDT	IEC 61162 sentence: True heading
HDG	IEC 61162 sentence: Magnetic compass heading
HTC	IEC 61162 sentence: Heading/track control command
HTD	IEC 61162 sentence: Heading/track control data
IMO	International Maritime Organization
INS	Integrated navigation system
ITU	International Telecommunication Union
MWV	IEC 61162 sentence: Wind and speed angle
OOW	Officer of the watch
RSA	IEC 61162 sentence: Rudder sense angle
RPM	IEC 61162 sentence: Revolutions per minute
ROV	Remotely operated vehicle
SAR	Search and rescue
SENC	System electronic navigation chart
SINAD	Signal to noise and distortion
STI	Sound transmission index
TXT	IEC 61162 sentence: Text message
VDO	IEC 61162 sentence: AIS - VHF data link own-vessel message
VDM	IEC 61162 sentence: AIS - VHF data link message
VHF	Very high frequency
VBW	IEC 61162 sentence: Dual ground water speed
XDR	IEC 61162 sentence: Transducer measurements
ZDA	IEC 61162 sentence: Time and date

NOTE For IEC 61162 sentences, see Annex A.

4 Performance requirements

Performance requirements described in the following clauses are specified, where relevant, by reference to the numbered paragraphs of IMO MSC.163(78), if not otherwise indicated.

4.1 General

Requirements specified in this PAS are only relevant to equipment designated as an S-VDR and required to meet IMO MSC.163(78).

For equipment designated as a VDR to IMO performance standards defined in resolution A.861(20) refer to IEC 61996.

A table of cross-references between this PAS and IEC 61996 is included in Annex D.

4.2 Purpose

(MSC.163(78) 1)

The purpose of a simplified voyage data recorder (S-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 S-VDR should be made available to both the Administration and the shipowner. This information is for use during any subsequent investigation to identify the cause(s) of the incident.

4.3 Operational requirements

(MSC.163(78) 5)

4.3.1 Design and construction

(MSC.163(78) 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 Organization³, shall take special account of the requirements for data security and continuity of operation as detailed in IMO MSC.163(78) 5.2 and 5.3 and in 4.3, 4.4 and 4.5 of this PAS.

4.3.2 Maintenance of sequential records

(MSC.163(78) 5.1.1)

The S-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

(MSC.163(78) 5.1.2, 5.4.1)

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 other 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 Protective capsule

4.3.4.1 Final recording medium

(MSC.163(78) 5.1.3)

The final recording medium shall be installed in a protective capsule. The capsule may be designed to remain fixed to the ship in all circumstances. Alternatively, it may be designed to float free automatically if the ship sinks (see 5.2). The capsule may also comply with the requirements of IEC 61996.

4.3.4.1.1 Fixed capsule

(MSC.163(78) 5.1.3.2)

The fixed type protective capsule shall comply with the requirements set out in resolution A.861(20) and this PAS with the exception of the resulting requirements for withstanding penetration.

4.3.4.1.2 Float-free capsule

(MSC.163(78) 5.1.3.3)

In addition to meeting the requirements of this PAS, the float-free type protective capsule shall

³ Refer to IEC 60945: Maritime navigation and radiocommunication equipment and systems – General requirements, methods of testing and required test results.

- a) be so constructed as to comply with the requirements specified in resolutions A.810(19);
- b) *be fitted with means to facilitate grappling and recovery* and be designed with due regard to preventing it from being fouled during release;
- c) *be so constructed as to minimise the risk of loss or damage to the recording medium during recovery operations.*

4.3.4.2 Access to capsule

(MSC.163(78) 5.1.3.1.1)(See also 5.2)

The capsule shall *be capable of being accessed following an incident but secure against tampering.*

The capsule shall enclose the final recording medium. The final recording medium shall not be accessible by standard operating procedures during normal ship operations.

A means shall be provided to retrieve stored information via an external device without opening the protective capsule.

4.3.4.3 Location and identification

(See also 5.2)

4.3.4.3.1 Location

(MSC.163(78) 5.1.3.1.4)(See 5.3)

The capsule shall be fitted with an appropriate device to aid location.

4.3.4.3.2 Visibility and marking

(MSC.163(78) 5.1.3.1)

The capsule, together with any outermost shell, *shall be of a highly visible* fluorescent orange colour, *marked with retro-reflective materials* that comply with the relevant requirements of IMO A.658(16) and marked with the legend:

“VOYAGE DATA RECORDER – DO NOT OPEN -
REPORT TO AUTHORITIES”

4.3.5 Assessment of recording medium

Where the storage medium cannot be readily and reliably inspected after an incident, means shall be provided to enable an accident investigator to determine, prior to an attempted replay, whether the storage medium has been subjected to an excessive level of heat, where the survival of the stored data may be in doubt.

4.3.6 Interfaces

(MSC.163(78) 7)

Interfacing to the various sensors required shall be in accordance with the relevant international interface standard, IEC 61162, where possible.

NOTE See Annex A.

The interfaces for bridge audio, communications audio and radar are defined in 5.6.1, 5.7.1 and 5.8.1 respectively.

Any interface units which may be required to convert non-IEC 61162 signals, shall conform to the requirements of IEC 60945.

In all cases, *any connection to any item of the ship's equipment shall be such that the operation of that equipment suffers no deterioration, even if the S-VDR system develops faults.*

NOTE No loss of steering or propulsion is allowed.

4.4 Data selection and security

(MSC.163(78) 5.2)

4.4.1 Selection of data items

(MSC.163(78) 5.2.1)

The minimum selections of operational data items to be recorded by the S-VDR are specified in 4.6. Optionally, additional items may be recorded provided that the requirements for the recording and storage of the specified selections are not compromised.

In addition to the operational data referred to in the preceding paragraph, a data block defining the configuration of the S-VDR and the sensors to which it is connected shall be written into the final recording medium during commissioning of the S-VDR. This configuration data shall be permanently retained in the final recording medium and protected from modification other than by a duly authorized person following any change to the configuration. Any change to the configuration of this data block shall not affect the recording of the mandatory items.

The following system configuration information and data source identity shall be included in this data block:

- a) type approval authority and reference;
- b) IMO vessel identification number;
- c) software version(s) used;
- d) microphone locations and recording port allocation;

NOTE This does not imply channelization.

- e) VHF communications – which VHF channel(s) recorded;
- f) date and time – from which source obtained;
- g) ship's position – from which EPES obtained and relative position on the vessel;
- h) other data inputs – identification of which equipment is supplying recorded data; sign conventions and identity of all alarm/door inputs;
- i) automatic insertion of date and time of last amendment.

4.4.2 Resistance to tampering

(MSC.163(78) 5.2.2)

The equipment shall be so designed that, as far as is practical, it is not possible to tamper with the selection of data being input to the equipment, the data itself nor that which has already been recorded. Any attempt to interfere with the integrity of the data or the recording shall be recorded.

4.4.3 Recording integrity

(MSC.163(78) 5.2.3)

The recording method shall be such that each item of the recorded data is checked for integrity, for example, it is identical to the data being received, and an alarm given if a non-correctable error is detected.

The S-VDR shall automatically continuously monitor the following (see 6.1.10):

- a) power supply;