

DIN EN 61996-2



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Ersatz für
DIN EN 61996-2:2007-02
Siehe jedoch Beginn der
Gültigkeit

**Navigations- und Funkkommunikationsgeräte und -systeme für die
Seeschifffahrt –
Fahrtdatenaufzeichnungsgeräte (VDR) auf Seeschiffen –
Teil 2: Vereinfachtes Fahrtdatenaufzeichnungsgerät (S-VDR) –
Leistungsanforderungen, Prüfverfahren und geforderte Prüfergebnisse
(IEC 61996-2:2007);
Englische Fassung EN 61996-2:2008**

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 (IEC 61996-2:2007);
English version EN 61996-2:2008

Matériels et systèmes de navigation et de radiocommunication maritimes –
Enregistreurs des données du voyage (VDR) de bord –
Partie 2: Enregistreur des données du voyage simplifié (S-VDR) – Exigences de
fonctionnement, méthodes d'essai et résultats d'essai exigés (CEI 61996-2:2007);
Version anglaise EN 61996-2:2008

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Normenstelle Schiffs- und Meerestechnik (NSMT) im DIN

Beginn der Gültigkeit

Die von CENELEC am 2008-06-01 angenommene EN 61996-2 gilt als DIN-Norm ab 2008-12-01.

Daneben darf DIN EN 61996-2:2007-02 noch bis 2011-06-01 angewendet werden.

Nationales Vorwort

Vorausgegangener Norm-Entwurf: E DIN EN 61996-2:2007-08.

Für diese Norm ist das nationale Arbeitsgremium K 738 „Elektronische Navigationsinstrumente“ der DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE (www.dke.de) zuständig.

Die enthaltene IEC-Publikation wurde vom TC 80 „Maritime navigation and radiocommunication equipment and systems“ erarbeitet.

Das IEC-Komitee hat entschieden, dass der Inhalt dieser Publikation bis zu dem Datum (maintenance result date) unverändert bleiben soll, das auf der IEC-Website unter „<http://webstore.iec.ch>“ zu dieser Publikation angegeben ist. Zu diesem Zeitpunkt wird entsprechend der Entscheidung des Komitees die Publikation

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Da sich die Benutzer der vorliegenden Norm der englischen Sprache als Fachsprache bedienen, wird die englische Fassung der IEC 61996-2 veröffentlicht. Für die meisten der verwendeten Begriffe existieren keine gebräuchlichen deutschen Benennungen, da sich die deutschen Anwender in der Regel ebenfalls der englischen Benennungen bedienen. Diese Norm steht nicht in unmittelbarem Zusammenhang mit Rechtsvorschriften und ist nicht als Sicherheitsnorm anzusehen.

Das Präsidium des DIN hat mit Präsidialbeschluss 1/2004 festgelegt, dass DIN-Normen, deren Inhalt sich auf internationale Arbeitsergebnisse der Informationsverarbeitung gründet, unter bestimmten Bedingungen allein in englischer Sprache veröffentlicht werden dürfen. Diese Bedingungen sind für die vorliegende Norm erfüllt.

Für den Fall einer undatierten Verweisung im normativen Text (Verweisung auf eine Norm ohne Angabe des Ausgabedatums und ohne Hinweis auf eine Abschnittsnummer, eine Tabelle, ein Bild usw.) bezieht sich die Verweisung auf die jeweils neueste gültige Ausgabe der in Bezug genommenen Norm.

Für den Fall einer datierten Verweisung im normativen Text bezieht sich die Verweisung immer auf die in Bezug genommene Ausgabe der Norm.

Der Zusammenhang der zitierten Normen mit den entsprechenden Deutschen Normen ergibt sich, soweit ein Zusammenhang besteht, grundsätzlich über die Nummer der entsprechenden IEC-Publikation. Beispiel: IEC 60068 ist als EN 60068 als Europäische Norm durch CENELEC übernommen und als DIN EN 60068 ins Deutsche Normenwerk aufgenommen.

Änderungen

Gegenüber DIN EN 61996-2:2007-02 wurden folgende Änderungen vorgenommen:

- a) Zu 4.3.6 wurde eine neue Anforderung für eine Schnittstelle hinzugefügt, die zum Abladen der gespeicherten Daten auf einen externen Computer zu verwenden ist. Dies ist in Anhang C festgelegt, der den Anhang C der EN 61996-2:2006 ersetzt.
- b) Eine optionale LAN-Schnittstelle für die Verbindung zu Radareinrichtungen wurde zu 5.8 hinzugefügt.
- c) Am Text wurden einige Korrekturen vorgenommen.

Frühere Ausgaben

DIN EN 61996-2: 2007-02

English version

**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
(IEC 61996-2:2007)**

Matériels et systèmes de navigation et de
radiocommunication maritimes –
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systeme für die Seeschifffahrt –
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(S-VDR) –
Leistungsanforderungen, Prüfverfahren und geforderte
Prüfergebnisse
(IEC 61996-2:2007)

This European Standard was approved by CENELEC on 2008-06-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in two official versions (English, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 80/471/CDV, future edition 2 of IEC 61996-2, prepared by TC 80, Maritime navigation and radiocommunication equipment and systems, was submitted to the IEC-CENELEC Parallel Unique Acceptance Procedure and was approved by CENELEC as EN 61996-2 on 2008-06-01.

This European Standard supersedes EN 61996-2:2006.

A new requirement has been added to 4.3.6 for an interface to be used for downloading the stored data to an external computer. This is defined in Annex C which replaces the Annex C of EN 61996-2:2006 which contained an IMO Circular which recommended such an interface. An optional LAN interface for connection to radar has been added in 5.8. Some corrections to the text have also been made.

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2009-03-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2011-06-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61996-2:2007 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60936-1	NOTE Harmonized as EN 60936-1:2000 (not modified).
IEC 60936-3	NOTE Harmonized as EN 60936-3:2002 (not modified).
IEC 61996-1	NOTE Harmonized as EN 61996-1:2008 (not modified).
IEC 62388	NOTE Harmonized as EN 62388:2008 (not modified).
ISO 8728	NOTE Harmonized as EN ISO 8728:1998 (not modified).
ISO 11674	NOTE Harmonized as EN ISO 11674:2001 (not modified).

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INTRODUCTION

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

This part of IEC 61996 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:

the requirements for monitoring certain sensors are reduced when the data is not provided in IEC 61162 format, and

the requirements for the protective S-VDR capsule are different from the VDR capsule, both for the fixed and float-free versions.

Annex B provides a cross-reference between this standard and IEC 61996-1 to aid test houses who may already have test results for VDRs which are being submitted as S-VDRs.

Subsequent to publishing the performance standard for S-VDR, MSC.163(78), in 2004, the IMO sub-committee on Safety of Navigation (NAV) discussed the issue of download and playback of information. Recognising that after an accident there is a need for investigators to be able to download the stored data and playback the information from VDRs/S-VDRs without delay, the sub-committee agreed on recommended means for extracting stored data for investigation authorities. This was adopted by MSC.81 in 2005 as an amendment to resolution MSC.163(78) given in resolution MSC.214(81). This edition of the standard incorporates this amendment.

**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 part of IEC 61996 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) or A.861(20) 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 60268-16:2003, *Sound system equipment – Part 16: Objective rating of speech intelligibility by speech transmission index*

IEC 60945:2002, *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 61162-1, *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 61260:1995, *Electroacoustics – Octave-band and fractional-octave-band filters*

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

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): *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)*

IMO MSC.214(81): *Annex 2: Amendments to the recommendation on performance standards for shipborne simplified voyage data recorders (VDRs) (Resolution MSC.163(78))*

IMO:1974, *International Convention for the Safety of Life at Sea (SOLAS), as amended*

ITU-R M.633-3:2004, *Transmission characteristics of a satellite emergency position-indicating radiobeacon (satellite EPIRB) system operating through a low polar-orbiting satellite system in the 406 MHz band*

Eurocae: ED56A Amendment 1 – *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 (DMT)*

SAE AS 8045:1988, *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

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

3.1 Definitions

3.1.1

activation of a suitable alarm

mutable audible alarm and persistent visual indication, given according to the requirements of IMO A.830(19) but with an audible level in the range of 55 dBA to 65 dBA

3.1.2

combined EPIRB/S-VDR capsule

a 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 S-VDR (as required by the carriage requirements of SOLAS V)

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
- helms
- communication

3.1.4

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

3.1.5

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

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

3.1.6

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

(FRM)

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

3.1.7

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

3.1.8

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

3.1.9

resolution

smallest detectable increment between two values

3.1.10

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

3.2 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
HDG	IEC 61162 sentence: Magnetic compass heading
HDT	IEC 61162 sentence: True 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 speed and angle

OOW	Officer of the watch
ROV	Remotely operated vehicle
RPM	IEC 61162 sentence: Revolutions per minute
RSA	IEC 61162 sentence: Rudder sense angle
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
UTC	Coordinated universal time
VDM	IEC 61162 sentence: AIS – VHF data link message
VDO	IEC 61162 sentence: AIS – VHF data link own-vessel 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 standard 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 61996-1.

A table of cross-references between this standard and IEC 61996-1 is included in Annex B.

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 shall 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 Organization¹, 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 this standard 4.3, 4.4 and 4.5.

¹ Refer to IEC 60945: Maritime navigation and radiocommunication equipment and systems – General requirements, methods of testing and required test results.

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 fixed capsule may also comply with the requirements of IEC 61996-1.

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 standard 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 standard, *the float-free type protective capsule shall:*

- a) *be so constructed as to comply with the requirements specified in resolutions A.810(19) and A.662(16);*
- 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 final recording medium during recovery operations; and*
- d) *be capable of transmitting an initial locating signal and a further locating and homing signal for at least 48 hours over a period of not less than 7 days/168 hours.*

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 also 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 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)

4.3.6.1 Compliance with IEC 61162

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

4.3.6.2 Data interface

The VDR shall provide an interface for downloading the stored data to an external computer (see Annex C).

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.

4.4.2 Configuration data

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 authorised 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 for all data items as required by MSC.163(78) 5.4:

- a) type approval authority and reference;
- b) IMO vessel identification number;
- c) software version(s) used;
- d) automatic insertion of date and time of last amendment.
- e) microphone locations, recording port allocation, and ID (two character identification for example M1, M2, etc.);

NOTE This does not imply that microphone audio channels shall be separated.

- f) VHF communications – Location of connected VHF installation(s) and recording port allocation, and ID (two character identification, for example V1, V2, etc.);
- g) Radar – which display output(s) are connected (at which channel), and ID (two character identification, for example R1, R2, Rx, etc.);
- h) date and time – from which source obtained;
- i) ship's position – from which EPFS and relative position of this EPFS on the vessel;
- j) other data inputs required by IMO MSC. 163 (78) and any additional data inputs defined in IMO A.861(20) 5.4:
 - i. identification of which equipment is supplying the data;
 - ii. identification of the sentence (IEC 61162) which is carrying the information (see Annex A for approved sentences);
 - iii. if received as proprietary sentences according to IEC 61162 (for example containing converted analogue or discrete signals), information to include the location of the information within the sentence and the specification of the relations between sensor values (RPM, rudder angles, state of alarm or indicator, etc.) and received values.

4.4.3 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.

4.4.4 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;
- b) record function;
- c) bit error rate;
- d) microphone functionality.

Malfunction of any of the above shall generate an alarm (see 3.1.1) in accordance with the relevant requirements of IMO A.830(19) at the position from which the vessel is normally navigated. It shall be possible to mute the alarm but a visual indication shall remain until the equipment is serviceable. It shall also indicate its alarm status by means of contacts of a relay (or equivalent) which is held energised in the no-alarm condition.

4.5 Continuity of operation

4.5.1 Operation

(MSC.163(78) 6)

The unit shall be entirely automatic in normal operation. Means shall be provided to ensure that the recorded data can be saved by an appropriate method following an incident, with minimal interruption to the recording process and without requiring opening of the protective capsule. Controls for use during the saving process shall be simple to use.

- a) The recording process to the final recording medium shall not be interrupted for more than 10 min during the saving process. The data recorded in the final recording medium shall not be erased.
- b) The data saved shall be automatically checked to ensure that it is identical to the recorded data on the final recording medium. Any failure shall be indicated.
- c) When the saving process is completed, means shall be provided to enable copies to be made of this or of data relating to subsequent incidents.
- d) When the saving process is completed, means shall be provided to enable the transfer of this data set to another storage device in order to allow data relating to subsequent incidents to be saved.

NOTE "saving process" – means – preserving a copy of the data contained in the final recording medium. A saved data set shall be protected against unauthorized or inadvertent overwriting.

4.5.2 Power source

(MSC.163(78) 5.3.1)

To ensure that the S-VDR continues to record events during an incident, it shall be capable of operating from the ship's emergency source of electrical power. Whenever electrical power is available the S-VDR shall operate, except as permitted in 4.5.4 (see 6.1.15).

4.5.3 Dedicated reserve power source

(MSC.163(78) 5.3.2)

If the ship's emergency source of electrical power supply fails, the S-VDR shall continue to record bridge audio (see 4.6.5) from its dedicated reserve source of power for a period of 2 h. At the end of this 2 h period all recording shall cease automatically (see 3.1.5).

4.5.4 Recording period and duration

(MSC.163(78) 5.3.3)

Recording shall be continuous unless interrupted briefly in accordance with 4.5.1 or terminated in accordance with 4.5.3. The time for which all stored data items are retained shall be at least 12 h. Data items which are older than this may be overwritten with new data.

Recording may also be terminated, by means of a key or other secure method.

NOTE This may occur under the following circumstances:

- a) during essential maintenance purposes whilst the vessel is in port;
- b) when the vessel is laid up;
- c) upon request by an investigation authority, for example after the vessel had been involved in a marine incident.

4.6 Data items to be recorded

(MSC.163(78) 5.4)

4.6.1 Date and time

(MSC.163(78) 5.4.1)

Date and time referenced to UTC, shall be obtained from a source external to the ship (for example, an EPFS or radio time signal if available), or from an internal clock at least once per hour. The recording shall indicate which source is in use. 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 the incident in detail, not worse than 1 s.

4.6.2 Ship's position

(MSC.163(78) 5.4.2)

Latitude and longitude, and the datum used, shall be derived from a designated EPFS or INS if available. The recording shall ensure that the identity and status of the source can always be determined on playback. The ship's position shall be recorded, as available on the ship, up to a resolution of 0,000 1 min of arc.

4.6.3 Speed

(MSC.163(78) 5.4.3)

Speed through the water, or speed over the ground (transverse as well as longitudinal in either case, as available on the ship), including an indication from which it is, derived from the ship's designated speed and distance measuring equipment, shall be recorded, as available on the ship, up to a resolution of 0,1 kn.

4.6.4 Heading

(MSC.163(78) 5.4.4)

As indicated by a designated ship's compass. The ship's heading shall be recorded, as available on the ship, up to a resolution of 0,1°.

4.6.5 Bridge audio

(MSC.163(78) 5.4.5)

One or more microphones positioned on the bridge shall be placed, such that conversation at or near the conning stations, radar displays, chart tables etc., (for example at work stations as defined in 3.1.9) may be adequately recorded. As far as is practicable, the positioning of microphones shall also capture the input and output of intercom, public address systems and the audible alarms on the bridge (bridge mounted equipment).

The audio signals at all work stations shall be recorded continuously. Optionally, means may be provided so that the originating work station can be identified with the audio signal being analysed during playback of the recorded information (see 5.6 for technical characteristics).

4.6.6 Communications audio

(MSC.163(78) 5.4.6)

VHF communications relating to ship operations shall be recorded, independently of the bridge audio. The recording shall include both transmitted and received audio signals and shall be continuous from a directly connected fixed VHF radio to be designated at installation of the S-VDR (see 5.7 for technical characteristics).

4.6.7 Radar data – post-display selection

(MSC.163(78) 5.4.7)

This shall include electronic signal information from within one of the ship's radar installations which records all the information which was actually being presented on the master display of that radar at the time of recording. This shall include any range rings or markers, bearing markers, electronic plotting symbols, radar maps, whatever parts of the SENC or other electronic chart or map that were selected, the voyage plan, navigational data, navigational alarms and the radar status data that were visible on the display. The recording method shall be such that, on playback, it is possible to present a faithful replica of the entire radar display that was on view at the time of recording, albeit within the limitations of any bandwidth compression techniques that are essential to the working of the S-VDR (see 5.8).

4.6.8 AIS

(MSC.163(78) 5.4.8)

Where there is no commercial off-the-shelf interface available to obtain radar data then AIS target data shall be recorded as a source of information regarding other ships; otherwise AIS information may be recorded additionally as a beneficial secondary source of information on both other and own ship.

The VDM message shall be recorded in such a way, that all target data available from the onboard AIS are acquired.

If the VDO message is recorded, this shall be additional to the recording of individual sensor data as per 4.6.1 to 4.6.4.

4.6.9 Other items

(MSC.163(78) 5.4.9)

Any additional data items listed by IMO with the requirements set out in resolution A.861(20) (4.6.10 to 4.6.17 below) shall be recorded where the data is available in accordance with the international digital interface standards² using approved sentence formatters.

4.6.10 Echo sounder

(A.861(20) 5.4.8)

This shall include depth under keel, up to a resolution of 0,1 m as available on the ship. The depth scale currently being displayed and other status information shall be recorded where available.

4.6.11 Main alarms

(A.861(20) 5.4.9)

This shall include the status of all IMO mandatory alarms on the bridge.

The status of all IMO mandatory alarms shall be recorded by the bridge audio and as a data parameter where practicable (see Annex D).

4.6.12 Rudder order and response

(A.861(20) 5.4.10)

Both *rudder order and response* angles shall be recorded up to a resolution of 1° as available and permitted on the ship. *Status and settings of heading or track controller, if fitted, shall also be recorded.*

4.6.13 Engine order and response

(A.861(20) 5.4.11)

This shall include the positions of any engine telegraphs or direct engine/propeller controls, including shaft(s) (revolutions or equivalent), and feedback indications, if fitted, including ahead/astern indicators. This shall also include status of bow and stern thrusters if fitted. Revolutions shall be recorded up to a resolution of 1 rpm and pitch shall be recorded up to a resolution of 1°.

4.6.14 Hull openings (doors) status

(A.861(20) 5.4.12)

This shall include all IMO mandatory status information required to be displayed on the bridge.

4.6.15 Watertight and fire door status

(A.861(20) 5.4.13)

This shall include all IMO mandatory status information required to be displayed on the bridge.

4.6.16 Accelerations and hull stresses

(A.861(20) 5.4.14)

Where a ship is fitted with IMO mandated hull stress and response monitoring equipment, all the data items that have been pre-selected within that equipment and are available shall be recorded.

² Refer to IEC 61162.

4.6.17 Wind speed and direction

(A.861(20) 5.4.15)

This shall be applicable where a ship is fitted with a suitable sensor. Either relative or true wind speed and direction may be recorded, but an indication of which it is shall be recorded.

5 Technical characteristics

5.1 Co-relation in date and time

To ensure that relative timings can be determined within a resolution of 0,1 s, all data items shall, when sampled by the S-VDR, be recorded with a time index derived from a S-VDR system clock with a resolution of 0,05 s. The drift of this system clock shall be not more than 1 s in 1 h.

5.2 Particular design requirements for the protective capsule

(MSC.163(78) 5.1.3)

The final recording medium shall be installed in a protective capsule of either a fixed or float-free type, which shall meet all of the following requirements:

- a) maintain the recorded data for a period of at least 2 years following termination of recording;*
- b) be of a highly visible colour and marked with retro-reflective materials.*

5.2.1 Fixed protective capsule

5.2.1.1 Design of the fixed capsule

The capsule containing the final recording medium shall be designed to be installed on the external deck of the vessel.

The capsule shall be designed to protect the stored data against the following (see 5.4.2.1):

- shock;
- fire;
- deep-sea pressure and immersion.

5.2.1.2 Release mechanism

The fixed capsule shall have a release mechanism to facilitate recovery under water by a diver or a remotely operated vehicle (ROV). Possible items to be considered are:

- a) the use of break-away bolts;
- b) release levers; or
- c) twist lock.

To ensure that the capsule may be retrieved safely after release, suitable large pad eyes or handles shall be incorporated.

NOTE It should be borne in mind that the manipulator jaws of typical underwater recovery machines have a maximum opening of only 300 mm, a gripping force limit of about 1 kN, and a pulling force limit of about 500 N.

5.3 Location beacon(s) for the protective capsule

(MSC.163(78) 5.1.3.1.4)

The capsule shall be fitted with an appropriate device to aid location, as follows:

5.3.1 Device for the location of the fixed capsule

The capsule shall include an acoustic underwater beacon meeting SAE AS 8045, operating in the frequency band of 25 kHz to 50 kHz with a battery life of at least 30 days.