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# No. 85 Recommendations on Voyage Data Recorder

(Jan 2005)  
(Rev.1  
Dec 2018)

These Recommendations are applicable to Voyage Data Recorders (VDR) required by SOLAS Chapter V, Reg. 20.

These Recommendations may be used by IACS Member Societies in conjunction with their requirements and procedures when approving VDR installation for ships.

The recommendations are based on the understanding that the applicable regulations and guidelines issued by the International Maritime Organization are complied with and, in particular IMO Res. A.694(17) and Res. MSC.333(90).

These Recommendations refer to VDRs installed on or after 1 July 2014. For VDRs installed before 1 July 2014 refer to Res. A.861(20), as amended by resolution MSC.214(81).

## 1. Type Approval

The VDR should be type approved (ref. SOLAS reg.V/18.1) and installed according to IMO Res. MSC.333(90). The VDR should be type tested according to IEC 61996.

## 2. Approval of documents

The following documents should be submitted for plan approval prior for the VDR installation onboard ship:

- General description of the installation
- Cable plan/block diagram identifying all sensors and cable types
- List of data items to be recorded by VDR
- All sensor's interface specification
- Location of all VDR components (e.g. main unit, fixed recording medium in its protective capsule, float-free recording medium in its float-free capsule, long-term recording medium, dedicated reserve power source, microphones)
- Information about power supply to the VDR
- Type Approval Certificate for the VDR issued by or on behalf of the Administration.

**No.  
85**

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**3. Survey****3.1 Testing of a new installation.**

The final installation should be tested according to the manufacturer's instructions. Testing of the installation normally requires attendance from the manufacturer representative and use of special playback equipment (ref. IMO Res. MSC.333(90), Annex, 5.1.3).

Before the surveyor attends the test, the VDR should record for a period of at least 12 hours with all sensor inputs active (in operation) before the recorded data is presented for the surveyor item by item according to paragraph 7 in this document.

The survey is to verify that the installation complies with paragraphs 4, 5 and 7 of this document. In addition to verifying that the required sensor data of paragraph 7 are recorded as applicable, it should be verified that the configuration file includes proper identification of the data received on the various input channels.

The procedures required for data retrieval should be included in the ship's safety management system<sup>1</sup> and to be verified by or on behalf of the Administration.

**3.2 Annual testing of VDR.**

The voyage data recorder system, including all sensors, should be subjected to an annual performance test. The test should be conducted by an approved service supplier to verify the accuracy, duration and recoverability of the recorded data. In addition, tests and inspections should be conducted to determine the serviceability of all protective enclosures and devices fitted to aid location (Ref. SOLAS Ch. V Reg.18.8 and HSC Reg.13.16.2).

The service supplier should be approved by the Society or approvals done by the Flag Administration itself or duly authorised organisations acting on behalf of the Flag Administration. Service supplier approvals granted on behalf of the Flag Administration are to be conducted in accordance with the procedures detailed in IACS UR Z17, with reference to Annex 1, paragraph 9 therein.

The Surveyor should check that the vessel has a copy of a valid Certificate of Compliance (COC) which should contain following information:

- name and IMO number of the ship
- date and place of successfully passed testing
- manufacturer, type and serial number of the VDR
- name and address of service supplier
- name and signature of the technician carrying out the annual performance test
- Society service supplier approval certificate number and the date of expire of the service supplier certificate.

If the ship is not able to present a Certificate Of Compliance to document the annual test, only a conditional short term Passenger Ship Safety Certificate/Cargo Ship Safety Equipment Certificate/Cargo Ship Safety Certificate should be issued.

<sup>1</sup> see section 10 of the ISM Code

#### **4. Location of the VDR components**

All VDR components should be installed according the VDR manufacturer's installation guidelines and any special requirements stated in the Type Approval Certificate.

##### **4.1 Fixed and float-free recording medium**

The protective capsule should be located in open deck area close to the bridge and as near to the centerline of the ship as practically possible. Considerations should be made to ensure both the accessibility for routine maintenance and the accessibility for both ROVs and divers in case of underwater removal after an accident. The location of the float-free capsule should minimise the interference by radar beam and the risk of obstruction after release.

##### **4.2 Microphones**

Microphones should be so positioned on the bridge covering all work stations as described in MSC/Circ.982 so that conversation is recorded. The recording should be such that, on playback, a normal speaking voice should provide adequate intelligibility while the ship is performing its normal operations. This performance should be maintained at all work stations while there is a single audio alarm anywhere on the bridge or any noise, including noise from faulty equipment or mounting, or wind. This should be achieved through the use of at least two channels of audio recording. Microphones positioned outside on bridge wings, should be recorded on at least one additional separate channel.

##### **4.3 Alarm unit**

The VDR alarm unit (audible alarm device and visual indicator) should be located in the navigation bridge.

##### **4.4 Other components**

All other VDR components can be located as found appropriate allowing for easy maintenance (ref. IMO Res. MSC.333(90), Annex, 5.1.3).

#### **5. Power supply**

The VDR should be connected to the ship's main and emergency source of power and backed-up by the dedicated reserve source of electrical power for a period of 2 hours.

Recording should be continuous unless automatically terminated at the end of the 2 hour period of the supply by the dedicated reserve source of electrical power.

#### **6. Sensor interfacing**

Loss of one sensor should not cause loss of other data items that do not depend upon the particular sensor (e.g. failure of the radar should not cause loss of other data items than the radar picture).

The signal information may be derived from discrete sensors wired directly to the VDR or may also be derived from a suitable data network connection. Where the information is derived from a data network the interfacing should be implemented in such a manner that the network will continue to operate as intended in the event of any VDR system or interface component fault. The data transfer should be conducted in accordance with a relevant international interface standard (ref. IMO Res. MSC.333(90), Annex, 8).

**No.  
85**

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**7. Sensor input****7.1 Date and time**

Date and time, referenced to UTC, should be obtained from a source external to the ship and an internal clock should be synchronized with valid date and time data. During times of a loss of the external source, the internal clock should be used. The recording should indicate which source is in use. The recording method should be such that the timing of all other recorded data items can be derived on playback with a resolution and continuity sufficient to reconstruct the history of the incident in detail (ref. IMO Res. MSC.333(90), Annex, 5.5.1).

**7.2 Ship's position**

From a global navigation satellite system receiver or alternatively, a terrestrial radionavigation system. The ships position should be recorded, as available on the ship, up to a resolution of 0.0001 min of arc.

**7.3 Speed**

Speed through water and speed over ground, including an indication which it is, derived from the speed and distance measuring equipment (speed log) should be recorded, as available on the ship, up to a resolution of 0.1 knots. The interval between recordings is not exceed 1 second. Speed over ground input from an Electronic Position Fixing System (EPFS) will require that EPFS is approved as speed log.

**7.4 Heading**

Heading from the main heading source in use should be recorded, as available on the ship, up to a resolution of 0.1. The interval between recordings is not exceed 1 second.

**7.5 Bridge audio**

The bridge audio signals should be recorded in accordance with paragraph 4.6.5 of IEC 61996.

**7.6 Communication audio**

From the VHF installed nearest to the conning position (see SOLAS Ch. V Reg. 22) or alternatively, nearest to the main radar display.

**7.7 Radar data**

The radar picture from the main radar (normally X-band at main conning position). Updating period less than every 15 second.

For ships where the statutory instrument requires two radar installations to be fitted and where inter switching facilities are provided between each installation the information from the radar installation that is in use by the navigator at the time of recording is the information that should be held in the voyage data recorder final recording medium.

**7.8 ECDIS**

Where a vessel is fitted with an ECDIS installation, the VDR should record the ECDIS display in use at the time as the primary means of navigation.

**No.  
85**  
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NOTE: In the case of a ship fitted with an INS, 'ECDIS display' signifies 'route monitoring task and functions display'.

Where multiple ECDIS are installed and when it is not possible to determine which ECDIS image is used as the primary means of navigation, all images should be recorded in sequence such that at least one image is recorded at an interval not exceeding 15 s, with the most recent image from each location stored in turn. E.g. when 3 ECDIS displays are in use then each ECDIS image should be recorded at least every 45 s.

**7.9 Echo sounder**

Depth below the keel up to a resolution of 0.1m as available on the ship. The depth scale currently being displayed and other status information should be recovered where available. Updating frequency better than 1 Hz.

**7.10 Main alarms**

This should include the status of all mandatory alarms on the bridge, as listed in Resolution A.1021(26), Code on Alerts and Indicators, table 10.1.1.

Where the alarm functions described in table 10.1.1 include more than one alarm, the items should be recorded such that the status of each individual alarm can be identified within the final recording medium.

Where the statutory instruments permits the installation of override arrangements of shutdown or alarm functions, the activation of the override should be identified in the final recording medium.

**7.11 Rudder order and response**

The status of all steering gear power units installed in the ship and the status and settings of the control mode should be identified within the final recording medium.

Where arrangements are made for the remote control of the steering gear from more than one location, such as bridge wings or from automatic control systems such as autopilots and track controllers the individual order and response for the steering gear from the control location in operation and settings of the control mode in operation should be identified within the final recording medium.

Rudder order and response angles should be recorded up to a resolution of 1 degree as available and permitted on the ship. The interval between recordings is not exceed 1 second.

**7.12 Engine and thruster order and response**

This should include the positions of engine telegraph or direct engine/propeller pitch controls in operation, including shaft(s) r.p.m (or equivalent), and feedback indications, if fitted, including ahead/astern indicators. This should also include status of all propulsion thrusters (i.e. r.p.m., pitch and thrust direction).

RPM should be recorded up to resolution of 1 r.p.m. Where the controllable pitch propeller is used, the pitch should be recorded up to a resolution of 1 degree. The interval between recordings is not exceed 1 second.

**No.  
85**  
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### 7.13 Hull openings status

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

Reference	Alarm	Applicability	Comments
SOLAS II-1			
15-1.2	Position of watertight external openings, except for cargo hatch covers	Cargo ships	

### 7.14 Watertight and fire door status

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

Reference	Alarm	Applicability	Comments
SOLAS II-1			
13.6 and 14.2	Power-operated watertight doors indication	Passenger ships constructed on or after 1 February 1992 or passenger ships carrying goods vehicles and accompanying personnel regardless of the date of construction (ref. SOLAS II- 1/16.1/2)	*
13-1.2	Position of internal watertight doors used while at sea	Cargo ships	*
13-1.3	Position of internal watertight door and access hatch covers normally closed at sea	Cargo ships	*
SOLAS II-2			
7.9.3	Fire door indication	Passenger ships carrying more than 36 passengers	* If located on the bridge
9.4.1.1.5.6	Fire door indication	Passenger ships	* If located on the bridge
9.4.1.1.5.13	Special category space fire door indication	Passenger ships	* Except if power operated and automatically closed

\* The status of each individual door should be identified within the final recording medium.

**No.  
85**  
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Where a ship is fitted with IMO mandated hull stress and response-monitoring equipment, all the data items that have been pre-selected within the equipment should be identified within the final recording medium. The interval between the recordings is not to exceed 1 second.

**7.16 Wind speed and direction**

This should be applicable where a ship is fitted with a sensor having a suitable output in accordance with IEC 61162. Either relative or true wind speed and direction should be identified within the final recording medium together with the information which of relative or true wind speed is recorded. The interval between the recordings is not to exceed 15 seconds.

**7.17 AIS**

All AIS data should be recorded.

**7.18 Rolling Motion**

The VDR should be connected to an electronic inclinometer if installed. The recording method should be such that the rolling motion can be reconstructed during playback.

**7.19 Electronic Logbook**

Where a ship is fitted with an electronic logbook in accordance with the standards of the IMO the information from this should be recorded.

NOTE: At the time of writing the IMO has not published any standards for this purpose.

**7.20 Additional information**

All other information recorded by the VDR should not degrade the performance of the VDR (e.g. reduce the capacity of the Protective Memory Capsule).

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