STANDARD FOR CERTIFICATION

No. 2.9

Type Approval Programme 849.82 MED - A.1/4.47

SIMPLIFIED VOYAGE DATA RECORDER (S-VDR)

APRIL 2009

DET NORSKE VERITAS

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FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

Standards for Certification

Standards for Certification (previously Certification Notes) are publications that contain principles, acceptance criteria and practical information related to the Society's consideration of objects, personnel, organisations, services and operations. Standards for Certification also apply as the basis for the issue of certificates and/or declarations that may not necessarily be related to classification.

A list of Standards for Certification is found in the latest edition of Pt.0 Ch.1 of the ”Rules for Classification of Ships” and the ”Rules for Classification of High Speed, Light Craft and Naval Surface Craft”.

The list of Standards for Certification is also included in the current “Classification Services – Publications” issued by the Society, which is available on request. All publications may be ordered from the Society’s Web site http://webshop.dnv.com/global/.

The Society reserves the exclusive right to interpret, decide equivalence or make exemptions to this Standard for Certification.

Comments may be sent by e-mail to *rules@dnv.com*
Comprehensive information about DNV and the Society's services is found at the Web site http://www.dnv.com

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CONTENTS

1. Scope

The type approval programme is for certifying that the equipment under test conforms to the predetermined set of standards.

The requirements are based on relevant IMO performance standards and IEC test standards as amended. Underlying standards may be used when referred to in "main" standard.

The procedure for assessment of conformity of manufactured products (production) is part of the scope for the type approval programme.

2. Conformity assessment of design of product type

2.1 Procedure

Type approval procedure consists of the following elements:

— application for type examination of the product
— design assessment
— type testing
— initial survey
— certificate retention survey.

2.2 Documents to be submitted for S-VDR

The following documentation is to be submitted for approval (email or CD) using a common electronic format and protocol (e.g. Acrobat(.pdf) or MS Word format (.doc) and AutoCad):

1) Block diagram showing the inter-relationship between all parts of the complete system (S-VDR) including main unit, interfaces, microphones, keyboard(s)/display(s)/panel(s), UPS, final recording medium (capsule/EPIRB).
2) Drawings, specifications and descriptions necessary to identify and describe all parts of the system, including set-up and operation of playback equipment.
3) Description of the logical and physical interfaces including converters and protective circuits.
4) Information on built-in data security and monitoring measures, including BER-monitoring of final recording medium and microphone surveillance.
5) List of main software modules installed comprising function, name and version number and identification of the OS.
6) Drawings or pictures showing the user interface of visual display units and user input devices.
7) Description of the UPS, including details on transformers, rectifiers, monitoring, capacity, S-VDR consumption, etc.
8) Environmental test program and Performance test program.

   Note:
   The Manufacturer is to submit the draft test programmes to DNV for approval prior to any performance type testing commence.

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9) Environmental- and Performance type test reports.
10) Specification of operational limitations if any.
11) Operation and installation manuals including commissioning specification.
12) Proposed or required maintenance procedures.
13) Description of failure detection facilities built-in-to the equipment, including alarm list.
14) Production quality assurance system
15) Product marking.

All the documentation submitted shall be marked in accordance with the manufacturer's QA-system and is to be prepared for easy reference of the various elements asked for.

2.3 Design requirements for S-VDR

The S-VDR equipment is to comply with relevant requirements of the following publications as amended:

— *IMO Resolution MSC.163(78)* Performance standard for shipborne simplified voyage data recorder.
— *IMO Resolution A.694(17)* General requirements for shipborne radio equipment forming part of the GMDSS and for electronic navigational aids.
— *IEC Standard 61996-2 (2007):* Simplified voyage data recorder (S-VDR) Performance requirements- Methods of testing and required test results
— *IEC Standard 60945 (2002)* Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results.
— *IEC Standard 61162-1 (2007):* Maritime navigation and radio communication equipment and systems, - Digital interfaces, Part 1: -Single talker and multiple listeners.
— *IEC Standard 61162-2 (1998):* Maritime navigation and radio communication equipment and systems, - Digital interfaces, Part 2: -Single talker and multiple listeners, high-speed transmission.
— *IEC Standard 61162-part 3 and higher:* -Maritime navigation and radio communication equipment and systems, - Digital interfaces. (LAN, CAN).

Publications may be obtained at:

— www.imo.org, IMO Publications
— www.iec.ch, IEC Publications.

2.4 Requirements for identification of product with certificate

The manufacturer is to specify type, type number, model, etc., which completely identifies the equipment and its components according to drawings/equipment specification.

All optional features are to be listed and those for which type approval is requested are to be marked, either by separate type numbers or by suffixes to the equipment's basic type number.

All drawings and descriptions are to be marked with drawing reference number, item name, issue date, etc., which identify the documentation completely.

In addition all main software modules installed per hardware unit shall be specified with names and version numbers.

The final product shall be provided with visible marking, giving at least the following information:

— identification of manufacturer
— equipment type number or model identification
— serial number
— safe distance to magnetic compass
— power consumption and/or supply voltage.

2.5 Elements of type approval

2.5.1 Application for type approval

The initial stage includes filling in a DNV application form requesting DNV type examination of the product(s). The appli-

cation form is to be forwarded to the local DNV station together with product documentation and proposed test programs.

2.5.2 Design assessment

The second stage involves DNV assessment of the documentation requested in sub-section 2.2 and is to verify that the design of the product is in conformance with the regulations and standards described in sub-section 2.3.

2.5.3 Type testing (TT)

When design assessment has been completed by the DNV, including approval of test programmes, the type testing may commence.

The type testing comprises:

— visual inspection
— performance type testing
— environmental type testing.

The type testing is either to be done in the presence of a DNV surveyor or to be conducted by a recognized laboratory holding a valid accreditation for the relevant tests. Alternatively, the presence of an independent expert from a recognised Authority may be accepted subsequent to approval by DNV Responsible Approval Centre.

The type testing shall be reported in accordance with EN 45001 (ISO 17025).

It is the *manufacturer's responsibility* to make sure that the type testing is performed in accordance with approved test programs so being acceptable to DNV.

2.5.3.1 Performance type testing

Tests are to be carried out to verify that the performance of the test sample conforms to the applicable requirements. The performance type tests shall as a minimum include those specified in the relevant test standards as amended listed in table of type tests.

2.5.3.2 Environmental type testing

Tests are to be carried out to verify that the test sample is "fit-for-purpose" in the marine environment as required by IMO performance standards.

The environmental type testing shall be done in accordance with the requirements of IEC 60945. Performance testing is to be conducted during relevant environmental tests. Tests are to be specified in the test program and sent to DNV for approval.

It is the manufacturer's responsibility to ensure that the environmental type testing is performed at an accredited laboratory accepted by DNV. A laboratory accepted by DNV with the presence of a qualified DNV surveyor might be used.

2.5.4 Routine tests (RT)

The routine tests, including commissioning tests on board, constitute the final production control and the manufacturers standard RT are to be described in the submitted documentation. These tests are normally to be carried out by the manufacturer or his representative unless otherwise is stated in the type approval certificate

2.5.5 Initial Type Approval Survey

An initial TA survey may have to be carried out to confirm that the manufacturer has a production line and quality control for consistent production of the equipment for which TA is requested.

2.5.6 Type approval certificate

When the design assessment and type testing are successfully completed a type approval certificate may be issued to the manufacturer verifying the conformity of the design of the product.

2.5.7 Certification retention survey

Periodical certificate retention surveys at least every second year are required to maintain the validity of the certificate. The objective is to verify that a consistent production quality control system is implemented and that the product has not been altered with respect to design and functions covered by the type approval.

2.5.8 Renewal of type approval certificate

At least three months before the period of validity expires, the certificate holder has to apply for renewal of the certificate.

Upon receipt of the request for renewal, DNV will perform a certificate retention survey as stated above.

The periodical certificate retention survey report will constitute the basis for renewal of the type approval and the issuance of a new certificate.

3. EC Conformity assessment procedure

3.1 EU Certification Scheme

3.2 Definitions

Notified Body (NB): means an organisation designated by the competent national administration of a Member State to undertake conformity assessment procedures of equipment specified in the EU directive on marine equipment. Such equipment may then be used on board ships registered in any Member State within the European Economic Area (EEA).

Conformity Assessment Procedures: means those procedures necessary to obtain an EC Type-Examination Certificate, QS-Certificate of Assessment - EC, Certificate of Conformity - EC and the manufacturer's Declaration of Conformity necessary for affixing the mark of conformity. The conformity assessment is subdivided into modules which relate to the design and production phases.

Modules: The certification scheme specifies different modules to be followed. There is a variety of modules covering the design and production phases, and the manufacturer may choose between different modules, dependent on type of product, the nature of the risk involved etc.

3.3 Entry into force of EU Directive on Marine Equipment

The EU "Council Directive 96/98/EC on Marine Equipment" (in force from 97.02.17 and mandatory from 99.01.01) includes the above product, and detailed testing standards in International instruments have already been worked out. The standards are specified in 2.3.

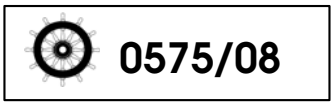
3.4 CE Marking (Wheel marking)

CE marking (mark of conformity, a ship wheel) of this product may be carried out by DNV as Notified Body.

The Directive is mandatory for the products when they are put onboard new or existing ships not previously carrying such equipment, or where it replaces equipment previously carried onboard, when the ship is flying the flag of any EEA (EU + EFTA) member state.

The manufacturer or is authorised representative established within the community shall affix the wheel mark to each product and draw up a written declaration of conformity at the end of the production phase.

The wheel shall be followed by the DNV identification number as Notified Body when involved in the production control phase, and by the last two digits of the number of the year in which the mark is affixed. See example below:



4. Certification of equipment according to the EU Directive on Marine Equipment

For certification of such equipment the EU Directive will require compliance with Modules B + D, or Modules B + E, or Modules B + F or Module G.

The DNV type approval will satisfy the EC type-examination required in Module B.

A summary of Modules B, D, E, F and G is also made below.

On request, further details of these EU Modules will be given by the local DNV surveyor.

4.1 Design Phase

4.1.1 Module B (Type-Examination)

DNV's type approval procedure is considered to be equal to Module B (EC type-examination) referred to in the EU Council Directive on Marine Equipment.

Renewal of an EC type-examination certificate (validity 5 years) will be based on a statement from the manufacturer confirming that no change has been made to the design of the product and annual audits of the production quality system.

4.2 Production Phase

For the production phase the manufacturer may choose between modules D, E, F and G.

If modules D and E are chosen, DNV as the Notified Body may approve his quality system (QS) and will then arrange with the necessary details, making it possible to affix a Wheel mark.

For all modules, the manufacturer shall draw up a declaration of conformity and affix the mark of conformity.

4.2.1 MED; marking of product

In order to mark the product with Mark of Conformity (Wheel mark), an audit at the manufacturer is required to be carried out.

This will be confirmed on a Module D, E, F or G certificate.

4.2.2 Module D (Production Quality Assurance)

If the manufacturer operates an approved QS for production and testing equivalent to the requirements in EN ISO 9002 (e.g. approved by DNV as the Notified Body), Module D may be used.

DNV shall issue a QS – Certificate of Assessment - EC.

The production quality control system is subject to annual DNV audits.

4.2.3 Module E (Product Quality Assurance)

If the manufacturer operates an approved QS for inspection and testing equivalent to the requirements in EN ISO 9003 (e.g. approved by DNV as the Notified Body), Module E may be used.

DNV shall issue a QS – Certificate of Assessment - EC.

The production quality control system is subject to annual DNV audits.

4.2.4 Module F (Product Verification)

Necessary measures shall be taken by the manufacturer, in order that the manufacturing process ensures conformity of the products with the type as described in the EC type-examination certificate (Module B).

DNV as the Notified Body shall carry out the appropriate examinations and tests in order to check the conformity of the product with the requirements of the International instruments either by:

— examination and testing of every product, or
— by examination and testing of products on a statistical basis.

DNV shall issue a Certificate of Conformity - EC.

4.2.5 Module G (Unit verification)

This Module is used for equipment being produced in small quantities.

The unit verification consists of 2 elements:

— assessment of technical documentation
— examination and test of the equipment concerned.

4.2.5.1 Examination of technical documents by DNV

Examination of technical documents to ensure that the design of a product or system conforms to the specified requirements will be carried out by branch experts at DNV Høvik.

4.2.5.2 Examination and test of equipment

The notified body shall examine the individual product and carry out appropriate tests to ensure that it complies with the relevant requirements of the International requirements specified in Annex B to the directive, Module G.

DNV will issue a Certificate of Conformity - EC.

5. Table of type tests for Simplified Voyage Data Recorder (S-VDR)

The manufacture shall submit a procedure of how to carry out the test described in this appendix

Tests are to be carried out at recognised laboratories or alternatively test sites approved by DNV (described in 2.5.3).

The manufacturer shall, unless otherwise agreed, set up the equipment and ensure that it is operating normally before type testing commences.

Tests to be carried out:

Table 5-1 E. Environmental tests

No	*TEST*	*Specification of test*	*Status*	*Comments*
E.1	Dry heat test, incl. extreme power supply	IEC 60945, 8.2 & 7.1		Performance test to be done
E.2	Damp heat test	IEC 60945, 8.3		
E.3	Low temperature test (Cold test), incl. extreme power supply	IEC 60945, 8.4 & 7.1		Performance test to be done. UPS capacity to be tested
E.4	Thermal Shock	IEC 60945, 8.5		Portable equipment only.
E.5	Drop	IEC 60945, 8.6		Portable equipment only.
E.6	Vibration test	IEC 60945, 8.7		
E.7	Rain Test	IEC 60945, 8.8		Exposed equipment only.

Table 5-1 E. Environmental tests				
E.8	Immersion test	IEC 60945, 8,9		Submerged or Portable equipment only.
E.9	Solar radiation	IEC 60945, 8.10		Portable equipment only. Waiver possible
E.10	Oil resistance	IEC 60945, 8.11		Portable equipment only. Waiver possible
E.11	Salt mist test	IEC 60945, 8.12		Waiver possible
E.12	Extreme power supply variation test	IEC 60945, 7.1		Normal temperature
E.13	Excessive power supply conditions	IEC 60945, 7.2		
E.14	Conducted emissions	IEC 60945, 9.2		
E.15	Radiated emissions	IEC 60945, 9.3		
E.16	Immunity to conducted radio frequency interference.	IEC 60945, 10.3		
E.17	Immunity to radiated radio frequency interference.	IEC 60945, 10.4		Not for submerged equipment
E.18	Immunity to fast transients on A.C. power, signal and control lines	IEC 60945, 10.5		Not for portable equipment
E.19	Immunity to surges A.C. power lines	IEC 60945, 10.6		Not for portable equipment
E.20	Immunity to power supply short-term variation	IEC 60945, 10.7		Not for portable equipment
E.21	Immunity to power supply failure	IEC 60945, 10.8		Not for portable equipment
E.22	Immunity to electrostatic discharge	IEC 60945, 10.9		Not for submerged equipment
E.23	Acoustic noise and signals test	IEC 60945, 11.1		All bridge mounted equipment
E.24	Compass safe distance	IEC 60945, 11.2		Not for submerged equipment
E.25	Protection against accidental access to dangerous voltages	IEC 60945, 12.1		Enclosure min IP20
E.26	Emissions from visual display unit	IEC 60945, 12.3		
E.27	Ergonomics and HMI check	IEC 60945, 6.1		May be performed during functional test
E.28	Hardware check	IEC 60945, 6.2		May be performed during functional test
E.29	Software check	IEC 60945, 6.3		May be performed during functional test
E.30	Inter-unit connection	IEC 60945, 6.3		May be performed during functional test

Table 5-2 I. Interface tests				
No	*TEST*	*Specification of test*	*Status*	*Comments*
I.1	Input circuits – limited current test	IEC 61162-1, B.4.2		
I.2	Input circuits – maximum voltage test	IEC 61162-1, B.4.4		
I.3	Input and output circuits – temperature test	IEC 61162-1, B.4.5		
I.4	Input circuits – maximum workload test	IEC 61162-1, B.4.6		
I.5	Output circuits – maximum workload test	IEC 61162-1, B.4.6		
I.6	Input circuits – corrupted data	IEC 61162-1, B.4.7		
I.7	Input & Output circuits – endurance test	IEC 61162-1, B.4.8		
I.8	Output circuits – protocol conformity test	IEC 61162-1, B.4.9.1		
I.9	Input circuits – protocol conformity test	IEC 61162-1, B.4.9.2		

Table 5-3 P. Performance tests				
No	*TEST*	*Specification of test*	*Status*	*Comments*
P.1	Full performance check	IEC 61996-2-2, 6.1.1.3		View recorded data on all channels
P.2	Documentation check	IEC 61996-2, 6.1.4		
P.3	Additional performance test for float-free capsule	IEC 61996-2-2, 6.1.5.1		Float free only
P.4	Recording duration test	IEC 61996-2, 6.1.6		
P.5	Reserve power source test (UPS)	IEC 61996-2, 6.1.7		
P.6	Recharging of UPS test	IEC 61996-2, 6.1.8		
P.7	Brief interruption of normal power supply	IEC 61996-2, 6.1.9		
P.8	System integrity test	IEC 61996-2, 6.1.10		
P.9	Maintenance of sequential records check	IEC 61996-2, 6.1.11		
P.10	Co-relation in date and time check	IEC 61996-2, 6.1.12		
P.11	Shock test	IEC 61996-2, 6.1.13.4 (IEC 60068-2-27, 11)		
P.12	Fire test	IEC 61996-2, 6.1.13.5		

Table 5-3 P. Performance tests				
P.13	Deep-sea immersion test	IEC 61996-2, 6.1.13.6		Fixed capsule only
P.14	Data integrity during float free operation	IEC 61996-2-2, 6.1.13.7 a)		Float free only
P.15	7 Day transmission test	IEC 61996-2-2, 6.1.13.7 b)		Float free only
P.16	Aid(s) to location test	IEC 61996-2, 6.1.13.9 (Additional requirements if float free)		
P.17	Means to facilitate grapping and recovery	IEC 61996-2, 6.1.13.10		Float free only.
P.18	Selection of data items check	IEC 61996-2, 6.1.14		
P.19	Power source check	IEC 61996-2, 6.1.15		
P.20	Recording of Date/time, position, speed, heading test	IEC 61996-2, 6.2.1		
P.21	Audio frequency response for Bridge audio	IEC 61996-2, 6.2.2.1		
P.22	Quality index for bridge audio, single port	IEC 61996-2, 6.2.2.2.1 (IEC 60268-16)		
P.23	Quality index for bridge audio, multiple ports	IEC 61996-2, 6.2.2.2.2 (IEC 60268-16)		
P.24	Audio noise level, signal-to-no signal for bridge audio	IEC 61996-2, 6.2.2.3		
P.25	Audio noise level, signal-to-noise and distortion for bridge audio	IEC 61996-2, 6.2.2.4		
P.26	Audio frequency response for communications audio	IEC 61996-2, 6.2.3.1		
P.27	Quality index for communications audio	IEC 61996-2, 6.2.3.2		
P.28	Audio noise level, signal-to-no signal for communications audio	IEC 61996-2, 6.2.3.3		
P.29	Audio noise level, signal-to-noise and distortion for communications audio	IEC 61996-2, 6.2.3.4		
P.30	Radar data, comparison of images	IEC 61996-2, 6.2.4.3		
P.31	Radar data, Pre-determined test images	IEC 61996-2, 6.2.4.4		
P.32	Radar data, colour errors	IEC 61996-2, 6.2.4.5		
P.33	Radar data, Horizontal positional errors	IEC 61996-2, 6.2.4.6.1		
P.34	Radar data, Vertical positional errors	IEC 61996-2, 6.2.4.6.2		
P.35	Radar data, subjective evaluation	IEC 61996-2, 6.2.4.7		
P.36	AIS, record and replay of data	IEC 61996-2, 6.2.5		
P.37	Other items, record and replay of data	IEC 61996-2, 6.2.6		
P.38	Interfaces	IEC 61996-2, 6.2.7		