



STANDARD FOR CERTIFICATION

No. 2.9

Type Approval Programme No. 7-890

INSTRUMENTATION AND AUTOMATION EQUIPMENT

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DET NORSKE VERITAS

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FOREWORD

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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.

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Comments may be sent by e-mail to rules@dnv.com

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1. Scope

This type approval programme is for certifying that a product type conforms to the minimum requirements for installation and use onboard a DNV classed vessel.

The requirements are based on DNV Rules for Classification of Ships (Pt.4. Ch.9 - Control and Monitoring Systems) and relevant performance standards depending on equipment category.

The Procedure for assessment of the quality control ensuring conformity during manufacturing of the product (i.e. production control) is part of 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 approval of the product
- design assessment
- type testing
- certificate retention survey.

2.2 Documents to be submitted

The following documentation shall be submitted, either using a common electronic format (*e.g. Acrobat(pdf) or MS Word format (doc)*) and protocol (email or CD) or hard copies in paper:

- 1) Drawings, schematics and functional description necessary to describe all parts of the equipment. The functional description can be in the form of user manuals, installation manuals, etc. as relevant.
- 2) Drawings & product specification of physical/electrical and logical interfaces including signal format, converters, I/O-cards, protective circuitry, data protocol, cabling, required configuration of sensors.
- 3) Hardware, firmware and software revision information, as applicable, necessary to identify the equipment under test.
- 4) Environmental test program, performance test program and specification of test site(s).

Note:

The Manufacturer may submit the draft test programmes to DNV for verification prior to the commencement of any environmental & performance type testing. A certificate of accreditation for the selected laboratory(ies) is generally a demand (ref. #2.5.3).

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- 5) Environmental- and Performance type test reports.
- 6) Special operational limitations if any.
- 7) Documentation about the Production quality assurance system
- 8) Product marking.

With regard to information element for each document further information can be found in Pt.4 Ch.9 Sec.1 Table C2 and/or Pt.0 Ch.3 Sec.2.

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

2.3 Design requirements

The equipment shall comply with relevant requirements of the

following publications as amended:

- DNV Standard for Certification No.2.4 (2006) Environmental test specification for instrumentation and automation equipment
- IEC Standard 60945 (Optionally required*) Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results
- IEC Standard 61162-series (Optionally required*) Maritime navigation and radio communication equipment and systems, - Digital interfaces: -Single talker and multiple listeners
- Applicable EN, IEC, ISO Performance standards, if existing.

* Compliance with IEC 60945 and IEC 61162 is normally required for equipment that is to be included in wheel marked applications as defined by the Marine Equipment Directive Annex 1.

Publications may be obtained at:

- www.dnv.com, DNV Publications
- www.iec.ch, IEC Publications
- www.cenelec.eu, EN Publications
- www.mared.org, Marine Equipment Directive.

2.4 Requirements to identification of type of product with certificate

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

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

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

In addition all firmware or 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
- 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 the formal DNV application (form 86.02a) asking for DNV type approval of the product(s). The application form shall be forwarded to the local DNV station together with product documentation and proposed test program(s).

2.5.2 Design assessment

The second stage involves DNV assessment of the documentation requested in sub-section 2.2 and will 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 the design assessment has been completed by DNV, including approval of all 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 valid accreditations from a recognized Organisation for the applicable tests. Alternatively, the presence of an independent expert from a recognised Authority may be accepted following the approval of the Responsible Approval Centre.

All the type testing shall be documented 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.

Performance type testing

Tests shall be carried out to verify that the performance of the test sample conforms to the applicable requirements.

Environmental type testing

The environmental type testing shall be done according to DNV Standard for Certification No. 2.4. Reference is given to Appendix A Test specification.

2.5.4 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 applicable product(s) for which TA is requested.

2.5.5 Type Approval Certificate

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

The Procedure for assessment of the quality control ensuring conformity during manufacturing of the product (i.e. produc-

tion control) is part of scope for the type approval programme.

2.5.6 Certification retention survey

Certificate retention surveys will have to be carried out at regular intervals as stated in the type approval certificate. The objective of the survey is to verify that the conditions for the type approval are not altered following the issuance of the certificate.

The main elements of the survey are:

- witnessing of tests/inspections on factory samples, selected at random from the production line
- review of type approval documentation
- review of possible changes in design, materials and performance
- ensure traceability between manufacturer's product marking and Type Approval Certificate

A report will be made and submitted to the client after a certificate retention survey has been carried out. Certificate retention survey report form 90.02a shall preferably be used.

2.5.7 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.

If there, in the validity period of the Type Approval Certificate, has been any change in the relevant standards or in the Society's Rules, a new design assessment and testing may be required to be carried out.

Upon receipt of the request for renewal, DNV will carry out a certificate retention survey.

The certificate retention survey reports will be considered part of the basis for renewal of the type approval and the issue of a new certificate.

Appendix A Test specification

The test procedures are specified in DNV Standard for Certification No. 2.4, April 2006.

Tests shall be carried out at test sites approved by the Society.

The manufacturer shall, unless otherwise agreed, set up the equipment in accordance with normal installation procedure and ensure that it is operating normally before type testing commences.

No	TEST	Specification of test	Basic standard	TT
E.1	Visual Inspection	SfC 2.4, 3.2		×
E.2	Electrical Power Supply Failure Test	SfC 2.4, 3.4	IEC 61000-4-11	×
E.3	Power Supply Variations Test	SfC 2.4, 3.5	IEC 61000-4-11	×
E.4	Vibrations Test	SfC 2.4, 3.6	IEC 60068-2-6	×
E.5	Dry Heat Test	SfC 2.4, 3.7	IEC 60068-2-2	×
E.6	Damp Heat Test	SfC 2.4, 3.8	IEC 60068-2-30	×
E.7	Cold Test	SfC 2.4, 3.9	IEC 60068-2-1	×
E.8	Salt Mist Test (only required for enclosure class C and D)	SfC 2.4, 3.10	IEC 60068-2-52, test Kb	×
E.9	Inclination Test (only required for equipment with moving parts)	SfC 2.4, 3.11	IEC 60092-504	×
E.10	Insulation Resistance Test	SfC 2.4, 3.12		×
E.11	High Voltage Test	SfC 2.4, 3.13		×
E.12	Conducted Low Frequency Immunity Test	SfC 2.4, 3.14.4		×
E.13	Electrical Fast Transient/Burst Immunity Test	SfC 2.4, 3.14.5	IEC 61000-4-4	×
E.14	Electrical Slow Transient/Surge Immunity Test	SfC 2.4, 3.14.6	IEC 61000-4-5	×
E.15	Conducted Radio Frequency Immunity Test	SfC 2.4, 3.14.7	IEC 61000-4-6	×
E.16	Radiated Electromagnetic Field Immunity Test	SfC 2.4, 3.14.8	IEC 61000-4-3	×
E.17	Electrostatic Discharge Immunity Test	SfC 2.4, 3.14.9	IEC 61000-4-2	×
E.18	Radiated Emission Test	SfC 2.4, 3.14.11	CISPR 16-1, 16-2	×
E.19	Conducted Emission Test	SfC 2.4, 3.14.12	CISPR 16-1, 16-2	×
E.20	Compass Safe Distance Test (only required for equipment that is to be installed less than 5 m from magnetic compass)	SfC 2.4, 3.15	IEC 60945, 11.2	×
E.21	Acoustic noise and Alarm Signal Levels for Equipment installed on the Bridge	SfC 2.4, 3.15	IEC 60945, 11.2	×
E.22	Additional Tests	SfC 2.4, 3.16		×

No	TEST	Specification of test	TT
P.1	Performance tests (to be determined based on type of equipment)	SfC 2.4, 3.3 or according to relevant EN, IEC, ISO performance standards	×

Appendix B

Optional test specification related to MED certification

Equipment that is intended for inclusion in wheel marked applications as defined by the Marine Equipment Directive Annex 1 needs to comply with international standards and regulations as defined by the directive. The Type Approval may optionally include verification according to such standards.

Typical test procedures are specified in the following publications:

- 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.

Tests shall be carried out at test sites approved by the Society.

The manufacturer shall, unless otherwise agreed, set up the equipment in accordance with normal installation procedure and ensure that it is operating normally before type testing commences.

No	TEST	Specification of test	TT
EM.1	Extreme & Excessive power supply	IEC 60945 7.1 & 7.2 (<i>normal temperature</i>)	×
EM.2	Dry heat test	IEC 60945, 8.2 & 7.1 (<i>extreme power supply</i>) & IEC 61162-1 annex C.4.5	×
EM.3	Damp heat test	IEC 60945, 8.3	×
EM.4	Low temperature test (Cold test)	IEC 60945, 8.4 & 7.1 (<i>extreme power supply</i>) & IEC 61162-1 annex C.4.5	×
EM.5	Vibration test	IEC 60945, 8.7	×
EM.6	Salt mist test (<i>this test may be waived for protected equipment if it is satisfactorily documented that the EUT will satisfy the test</i>)	IEC 60945, 8.12	×
EM.7	Conducted emissions	IEC 60945, 9.2	×
EM.8	Radiated emissions	IEC 60945, 9.3	×
EM.9	Immunity to conducted radio frequency disturbance	IEC 60945, 10.3	×
EM.10	Immunity to radiated radio frequencies	IEC 60945, 10.4	×
EM.11	Immunity to fast transients on A.C. power, signal & control lines	IEC 60945, 10.5	×
EM.12	Immunity to surges on A.C. power lines	IEC 60945, 10.6	×
EM.13	Immunity to power supply short-term variation	IEC 60945, 10.7	×
EM.14	Immunity to power supply failure	IEC 60945, 10.8	×
EM.15	Immunity to electrostatic discharge test	IEC 60945, 10.9	×
EM.16	Acoustic noise test	IEC 60945, 11.1	×
EM.17	Compass safe distance	IEC 60945, 11.2 (or ISO/R 694)	×
EM.18	Enclosure test (IP20)	IEC 60945, 12.1	×
EM.19	Emissions from visual display unit (<i>this test may be waived if it is satisfactorily documented that the EUT will satisfy the test</i>)	IEC 60945, 12.3	×
EM.20	Ergonomics and HMI check	IEC 60945, 6.1	×
EM.21	Hardware check	IEC 60945, 6.2	×
EM.22	Software check	IEC 60945, 6.3	×

No	TEST	Specification of test	TT
IM.1	Input circuits – limited current test	IEC 61162-1, C.4.2	×
IM.2	Input circuits – maximum voltage test	IEC 61162-1, C.4.4	×
IM.3	Input and output circuits – temperature test	IEC 61162-1, C.4.5 (<i>ref. E.2 & E.4</i>)	×
IM.4	Input circuits – maximum workload test	IEC 61162-1, C.4.6	×
IM.5	Output circuits – maximum workload test	IEC 61162-1, C.4.6	×
IM.6	Input circuits – corrupted data	IEC 61162-1, C.4.7	×
IM.7	Input & Output circuits – endurance test	IEC 61162-1, C.4.8	×
IM.8	Output circuits – protocol conformity test	IEC 61162-1, C.4.9.1	×
IM.9	Input circuits – protocol conformity test	IEC 61162-1, C.4.9.2	×

No	TEST	Specification of test	TT
PM.1	Performance tests (<i>to be determined based on type of equipment</i>)	According to relevant IMO standards, ISO standards and/ or IEC standards	×