STANDARD FOR CERTIFICATION

No. 2.9

Type Approval Programme No. 7-891.40 / MED A.1/3.51

FLAME DETECTORS

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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.

This document is valid until superseded by a new revision or withdrawn.

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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1. Scope

Type approval is a programme for certifying that a product type is in conformity with a set of predetermined requirements. In the following, the term "type approval" is used for both DNV type approval and MED type examination.

The type approval will certify that a product type conforms to the minimum requirements as outlined in section 2.3 below.

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

The 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 is to be submitted the local DNV office, either using a common electronic format *(e.g. Acrobat(.pdf) or MS Word (.doc))* and protocol (e-mail or CD) or hard copies in paper:

— functional description
— system block diagrams
— user interface documentation
— power supply arrangement
— arrangement and layout
— instrument and equipment list
— circuit diagrams
— test procedures
— test reports
— documentation related to software if applicable (including software version numbers).

For details, please refer to DNV Rules for Classification, Pt.4 Ch.9 Sec.1 Control and Monitoring Systems.

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

When applying for a type approval an Application for Type Approval, Form No.: 86.02a / 43.44a, as applicable, shall be duly filled in and submitted.

2.3 Design requirements

The equipment shall comply with relevant requirements of the following publications:

— SOLAS 2000 Reg. II-2/7.2.2, Reg. II-2/7.4, Reg. II-2/7.4.1, Reg. X 3
— IMO Res. MSC.98(673) – (FSS Code) 9,
— IMO Res. MSC.97(73) 7.9.3.3 (2000 HSC Code) 7.7.1.

The product shall be tested in accordance with:

— EN 54-10 (2002) – Flame Detectors
— IEC 60092-504 (2001)
— IEC 60533 (1999)

as amended.

Publications may be obtained at:

— www.imo.org, IMO Publications
— www.iec.ch, IEC Publications
— www.cenelec.eu, EN Publications
— www.mared.org, Marine Equipment Directive.

2.4 Requirements for 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 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 supply voltage.

2.5 Elements of type approval

2.5.1 Application for type approval

The initial stage includes filling in a formal DNV application form asking for type approval of the product(s). The application form shall 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 requested documentation (ref. section 2.2) and verification that the product design is in conformance with the requirements (ref. section 2.3.)

2.5.3 Type testing (TT)

When the design assessment has been completed by DNV, including approval of all test procedures, 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 in DNV.

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 procedures.

2.5.3.1 Visual inspection

The product shall be visually inspected for good workmanship, conformity with the manufacturer's drawing and specifications, and the DNV Rules for Classification as applicable.

2.5.3.2 Performance type testing

Tests shall 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 EN 54-10.

2.5.3.3 Environmental type testing

Tests shall be carried out to verify that the test sample conforms to the requirements of Rules for Classification of Ships, DNV Standard for Certification No. 2.4 (tests from IEC 60068, IEC 61000, IEC 60945, CISPR 16-1,2). Guidance for format of test report is EN 45001 (ISO 17025).

2.5.4 Routine tests (RT)

The routine tests, including commissioning tests on board, constitute the final production control and the manufacturers standard RT shall be described in the submitted documentation. The manufacturer or a representative normally carries out these tests, unless otherwise is stated on 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 applicable product(s) 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 will be issued to the manufacturer for the conformity of the design of the product type.

2.5.7 Certification retention survey

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

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 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 issuance of a new certificate.

3. EC Conformity Assessment Procedure

3.1 EU Certification Scheme

3.1.1 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.

3.2 Entry into force of EU Directive on Marine Equipment

The 4th Amendment of Council Directive 96/98/EC which entered into force 2009.07.21 (Directive 2008/67/EC), includes the above product, and detailed testing standards have already been worked out. The standards are specified in section 2.3.

3.3 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 its 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 Flame Detectors 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.

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

A summary of Modules B, D, E and F 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.

4.2 Production Phase

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

If modules D or 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 wheel mark.

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

4.2.1 Module D (Production Quality Assurance)

If the manufacturer operates a QS for production and testing

equivalent to the requirements in EN ISO 9001 (2000), Module D may be used.

DNV has to assess the QS and issue an audit report. This assessment consist of 2 main elements:

a) assessment of quality system documentation

b) quality system audit at the manufacturer's premises.

DNV will issue a QS - Certificate of Assessment - EC.

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

4.2.2 Module E (Product Quality Assurance)

If the manufacturer operates a QS for inspection and testing equivalent to the requirements in EN ISO 9001 (2000), Module E may be used.

DNV has to assess the QS and issue an audit report. This assessment consist of 2 elements:

a) assessment of quality system documentation

b) quality system audit at the manufacturer's premises.

DNV will issue a QS - Certificate of Assessment - EC.

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

4.2.3 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 will 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 will issue a Certificate of Conformity - EC.

5. Test specification

The minimum test procedures are specified in the following publications:

— IEC Standard 60068-2-2(1974) - Environmental testing - Part 2: Tests. Tests B: Dry heat
— IEC Standard 60068-2-3 - Environmental testing - Part 2: Tests. Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)
— IEC Standard 61000-2-6(1995) - Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)
— IEC Standard 61000-4-2 (2001) - Electromagnetic compatibility (EMC)- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
— IEC Standard 61000-4-3 (2006) - Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
— IEC Standard 61000-4-4 (2006) - Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
— IEC Standard 61000-4-5 (2005) - Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
— IEC Standard 61000-4-6 (2003) - Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
— IEC Standard 61000-4-16 (2002) - Electromagnetic compatibility (EMC) - Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz
— IEC Standard 60945, 12.1 (2002) - Maritime navigation and radio communication equipment and systems - General requirements - Methods of testing and required test results
— CISPR 16-1 (2003) International Electrotechnical Commission -Specification for radio disturbance and immunity measuring apparatus and methods
— CISPR 16-2 (2003) - International Electrotechnical Commission -Specification for radio disturbance and immunity measuring apparatus and methods
— EN-54-10 (2002) - Fire detection and fire alarm systems - Part 10: Flame Detectors.

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.

Table 5-1 Environmental tests				
No	*TEST*	*Specification of test*	*TT*	*Comments*
E.1	Dry heat test	SfC 2.4, 3.7		IEC 60068-2-2
E.2	Damp heat test	SfC 2.4, 3.8		IEC 60068-2-30
E.3	Cold test	SfC 2.4, 3.9		IEC 60068-2-1
E.4	Vibration test	SfC 2.4, 3.6		IEC 60068-2-6
E.5	Conducted Low Frequency Immunity	SfC 2.4, 3.14.4		
E.6	Electric Fast Transient/Burst Immunity	SfC 2.4, 3.14.5		IEC 61000-4-4
E.7	Electric Slow Transient/Surge Immunity	SfC 2.4, 3.14.6		IEC 61000-4-5
E.8	Conducted Radio Frequency Immunity	SfC 2.4, 3.14.7		IEC 61000-4-6
E.9	Radiated Electromagnetic Field Immunity	SfC 2.4, 3.14.8		IEC 61000-4-3
E.10	Electrostatic Discharge Immunity Test	SfC 2.4, 3.14.9		IEC 61000-4-2
E.11	Radiated Emission Test	SfC 2.4, 3.14.11		CISPR 16-1, 16-2
E.12	Conducted Emission Test	SfC 2.4, 3.14.12		CISPR 16-1, 16-2
E.13	Protection (enclosure)	IEC 60529		
E.14	SO_2 corrosion (endurance)	EN 54-10, 5.11		
E.15	Shock (operational)	EN 54-10, 5.12		
E.16	Impact (operational)	EN 54-10, 5.13		

Table 5-2 Performance tests				
No	*TEST*	*Specification of test*	*TT*	*Comments*
P.1	General	EN 54-10, 5.1		
P.1.1	Atmospheric conditions for tests	EN 54-10, 5.1.1		
P.1.2	Operation condition for tests	EN 54-10, 5.1.2		
P.1.3	Mounting arrangement	EN 54-10, 5.1.3		
P.1.4	Tolerance	EN 54-10, 5.1.4		
P.1.5	Determination of response point	EN 54-10, 5.1.5		
P.1.6	Test procedure	EN 54-10, 5.1.6		
P.1.7	Reduced functional tests	EN 54-10, 5.1.7		
P.1.8	Provision for tests	EN 54-10, 5.1.8		
P.1.9	Test Schedule	EN 54-10, 5.1.9		
P.2	Reproducibility	EN 54-10, 5.2		
P.3	Repeatability	EN 54-10, 5.3		
P.4	Directional dependence	EN 54-10, 5.4		
P.5	Fire sensitivity	EN 54-10, 5.5		
P.6	Dazing	EN 54-10, 5.6		

Table 5-3 Design requirements				
No	*REQUIREMENTS*	*Specification of requirements*	*TT*	*Comments*
D.1	Classification	EN 54-5, 4.2		
D.2	Position of heat sensitive elements	EN 54-5, 4.3		
D.3	Individual alarm indication	EN 54-10, 4.3		
D.4	Connection of ancillary device	EN 54-10, 4.4		
D.5	Monitoring of detachable detectors	EN 54-10, 4.5		
D.6	Manufacturer’s adjustments	EN 54-10, 4.6		
D7	On-site adjustment of response behaviour	EN 54-10, 4.7		
D.8	Data	EN 54-10, 4.8		
D.9	Additional requirements for software controlled manual call points	EN 54-10, 4.9		
D.9.1	Software documentation	EN 54-10, 4.9.2		
D.9.2	Software design	EN 54-10, 4.9.2		
D.9.3	Storage of programs and data	EN 54-10, 4.9.4		