STANDARD FOR CERTIFICATION

No. 2.9

Type Approval Programme No. 1-501.20

ELASTOMER CORE MATERIALS FOR USE IN SANDWICH PLATE SYSTEM (SPS) OR SIMILAR

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DET NORSKE VERITAS

Veritasveien 1, NO-1322 Høvik, Norway Tel.: +47 67 57 99 00 Fax: +47 67 57 99 11

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This document is valid until superseded by a new revision or withdrawn.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

Det Norske Veritas (DNV) Type Approval is based on the ISO/ IEC Guide 2 (1991) definition:

"Approval of conformity with specified requirements on the basis of systematic examination of one or more specimens of a product representative of the production."

The requirements are specified in Rules and/or standards referred to in this Type Approval programme.

This Type Approval programme outlines the procedure and conditions for obtaining, maintaining and renewing a Type Approval. DNV Certification Notes No. 1.2 (2009) describes the Type Approval in general.

Type Approved products will be listed in DNV's Register of Type Approved Products, available on the DNV Internet site at http://exchange.dnv.com/.

2. Procedure

The Type Approval procedure normally consists of the following steps:

— application for Type Approval
— quotation
— assessment of Type Approval documentation
— initial survey of product and production facilities including witnessing of Type Tests
— assessment of survey report and Type Test results
— issuance of Type Approval Certificates
— Certificate Retention Survey after two (2) years
— application for renewal after four (4) years.

Explained in detail:

2.1 Application for Type Approval

The Type Approval should be applied for in writing to DNV's local office. The application shall include Type Approval documentation as specified in section 3.

2.2 Quotation

A quotation will be given by DNV approval office, to be confirmed by the client.

2.3 Assessment of Type Approval documentation

The Type Approval documentation is assessed by DNV Approval office to verify that it is in conformity with the specified requirements.

2.4 Initial Survey of product and production facilities including witnessing of Type Tests

The objective of Initial Survey is to verify that the production, quality control arrangement, product design, material composition and the product marking is according to the Type Approval documentation.

The main elements of a DNV Initial Survey are:

— ensure that production and quality control arrangement are according to requirements as specified in section 4.3 and as stated in Type Approval documentation submitted by manufacturer
— witness Type Tests, as specified in section 4.4
— ensure traceability between manufacturer's product marking and the type designation as stated in the application for Type Approval.

The objective of Type Tests is to verify the ability of the product to meet specified requirements by subjecting the test sample to physical, chemical, environmental or operational stresses.

Type Tests as specified in section 4.4 are to be carried out and verified in one of the following ways:

— At a DNV laboratory
— At a recognised and independent laboratory accepted by DNV
— At the manufacturer's premises in the presence of a DNV surveyor

The Initial Survey report and Type Test results are to be submitted to DNV Approval Office for evaluation.

2.5 Assessment of survey report and Type Test results

The assessment of Initial Survey report and Type Test results verifies compliance with the requirements/determines the values to be stated on the Type Approval Certificate (if applicable).

2.6 Issuance of Type Approval Certificates

When the assessment of Type Approval documentation, Type Testing and survey of production and quality control arrangement is successfully completed a Type Approval Certificate will be issued to the manufacturer of the product. The certificate is normally given a validity period of four (4) years, with a Certificate Retention Survey after two (2) years.

2.7 Certificate Retention Survey after two (2) years

The objective of the Certificate Retention Survey is to verify that the product design, material composition and the product marking are not altered since issuance of the Type Approval Certificate.

Certificate Retention Survey is to be carried out two (2) years after issuance of Type Approval Certificate.

The main elements of the Certificate Retention Survey are:

— ensure that Type Approval documentation is available
— review design, materials, performance and production process (as specified in section 4.3) with respect to possible changes, in order to ensure compliance with Type Approval documentation and/or referenced material specifications
— ensure traceability between manufacturer's product marking and the DNV Type Approval Certificate as stated in section 4.5
— witness tests/inspection on factory samples, selected at random from the production line (where practicable), or storage, if specified in section 4.4.

The Certificate Retention Survey report shall conclude that either:

a) the Type Approval Certificate shall be retained,
or
b) the Type Approval Certificate shall be modified/recalled due to the changes in the basis for approval

The Certificate Retention Survey report shall be submitted to the manufacturer and to DNV Approval Office.

2.8 Application for renewal after four (4) years

Application for renewal should be submitted to DNV not later than three (3) months before expiry date of the Type Approval Certificate.

The application shall include updated Type Approval documentation as specified in section 3, item 1-6. Items 7-11 shall be submitted if changes have been implemented since last issuance of the Type Approval.

Upon receipt of the application, DNV will perform a Renewal Survey with objective to verify that the product design, material composition and the product marking are not altered since issuance of the Type Approval Certificate.

Renewal Survey is to be carried out not later than four (4) years after issuance of the Type Approval Certificate.

The main elements of a Renewal Survey are the same as specified for the Certificate Retention Survey in section 2.7.

If there, since last issuance of the Type Approval Certificate, has been any change in the relevant standards or in DNV Rules, new assessment of product and Type Tests may be required.

The Renewal Survey report will constitute part of the basis for renewal of the Type Approval Certificate.

3. Documents to be submitted

The following Type Approval documentation is to be submitted by the manufacturer at Initial Type Approval and updated, at renewal. The documentation shall be in triplicate, one copy will be returned to the manufacturer with the Type Approval Certificate and one to the local DNV station/surveyor. The documentation shall be in English, if not otherwise agreed. (Please number documentation according to below list to facilitate review):

1) Type designation, i.e. product name with list of variants that are to be included in the Type Approval and stated on the Type Approval Certificate.
2) Name and address of manufacturer, to be listed on Type Approval Certificate. Additionally, the following shall be specified, if applicable:
   - person in charge
   - phone and fax numbers
   - e-mail and web address.
3) Basis for approval. A reference to applicable Rules and Standards, ref. section 4.1, which the product is to comply with.
4) Product description (*type of material, additives, etc.*).
5) Field of Application and special limitations of the product (Application procedure and required surface treatment prior to filling, compatibility/non-compatibility with other materials/chemicals, etc.)
6) Product specification, for variants according to section 4.4.
7) Type Test results including a summary according to section 4.4.
8) Survey report from DNV local unit, ref. section 2.4
9) Description of production processes. *)
10) Description of quality control arrangement. *)
11) Information regarding marking of the product or packaging

*) To be verified by Initial Survey prior to the issuance of the Type Approval Certificate.

4. Requirements

4.1 Basis for Type Approval

The requirements in this section will serve as basis for issuance of Type Approval Certificate for elastomer core materials intended for use in Sandwich Plate Systems (SPS), or in similar applications.

4.2 Scope of Type Approval

One DNV Type Approval Certificate will be valid for one quality/grade of the actual product with the possibility to include variants.

For elastomer core materials/fillers this means:

Quality: *one* base material / chemical composition.
Variants: different additives and fillers, and different densities.

All variants shall fulfil the requirements to the same grade.

One DNV Type Approval Certificate is limited to one manufacturer at one production site.

4.3 General requirements

4.3.1 *Requirements to production and quality control arrangement*

The manufacturer should have a quality system that meets ISO 9001 standards, or equivalent. If this quality standard is not fulfilled, the extent of testing and surveys will be specially considered.

Quality control arrangement, including requirements in Table 4-1, are to be checked with respect to the following at Initial, Retention and at Renewal Surveys:

- control on incoming material
- test equipment, test methods, test samples and references to standards used
- traceability and marking system
- Production test reports from delivery testing.

The extent of the manufacturer's quality control during production shall as a minimum be as listed in Table 4-1 to ensure even product quality.

The manufacturer shall carry out delivery testing of each consignment and measured values shall be filed and be made available to the surveyor.

4.3.2 *Description of Type Testing*

The extent of Type Testing covers both the liquid component properties and the cured elastomer properties in sections 4.4. These tests are to ensure that the product properties are as stated by the manufacturer.

Type Testing results from all variants are to be submitted to the Society for evaluation, including a summary of the Type Tests results. If there are several similar variants a less extensive test program can be agreed upon with the Society prior to testing.

Other standardised, and/or internal, test methods than those given for the respective materials may be used upon agreement. Liquid properties of components will be checked according to product specification at DNV Survey.

4.4 Requirements to material

4.4.1 *General*

The elastomer core material shall have stable long term properties. Continuous chemical processes, diffusion, etc. shall not affect the physical properties of the elastomer core material or the core metal interface. If considered necessary, documentation of specific long term properties may be required.

If special surface treatment is required, this shall be stated in the application for Type Approval, and it will be stated, or referenced, on the Type Approval Certificate.

4.4.2 *Preparation of test samples*

Curing conditions shall be according to the manufacturer’s specifications, preferably at temperatures obtainable in the shipyard.

Detailed description of surface treatment and application pro-

cedure (including curing conditions) are to be specified in the relevant application process guidelines.

4.4.3 *Acceptance Criteria*

Components that have properties that are outside of the Acceptance Criteria in Table 4-1 may be accepted by the Society if it can be demonstrated to the Society's satisfaction that the resultant Elastomer Core Material meets the requirements of Table 4-2.

Table 4-1 Manufacturer's quality control for the components used in the Elastomer Core Material

Property	*Test standard* [1]	*Frequency of control*	*Acceptance Criteria*	*Minimum level of verification*
Component A (e.g. Polyol)				
Hydroxyl Number	DIN 53240	Each batch	325 ± 35mg KOH/g	Results reported on inspection certificate
Component B (e.g. Isocyanate)				
NCO content	DIN EN ISO 14896	Each batch	31.5 ± 1%	Results reported on inspection certificate
Viscosity at 25°C	DIN 53018, T 1+2 DIN 53019	Each batch	210 ± 40mPas	Results reported on inspection certificate
Combination (Component A + B)				
Reactivity – Pot Life (open time)	Recognised test method	Each batch	> 660 s	Results reported on inspection certificate

[1] Other test methods/test specifications, standardised or internal, may be agreed upon with the Society prior to testing.

Table 4-2 Requirements to Elastomer Core Materials

Property	*Test standard* [1]	*Number of parallels*	*Acceptance Criteria*	*Minimum level of verification*
Density	ISO 845	min. 5	> 1 000 kg/m^3	DNV Survey
Tensile Strength	ISO 527 ASTM D412	min. 5	> 5 MPa at +80°C	DNV Survey
Tensile Modulus			< 1 500 MPa at -20°C > 200 MPa at +80°C	
Elongation at break			min. 10% at -20°C	
Compressive Strength	ISO 604 ASTM D575	min. 5	> 5 MPa at +80°C	DNV Survey
Compressive Modulus			< 1 500 MPa at -20°C > 200 MPa at +80°C	
Shear Modulus (G)	Torsion Pendulum Test -20°C to +80°C, or +80°C only DIN EN ISO 6721-2	min. 5	G ≥ 312-2.4T (°C) or, min. 120 MPa at +80°C	DNV Survey
Bonding Strength	ASTM D429-81	min. 5	2.7 MPa (shot blasted) 4 MPa (grit blasted)	DNV Survey

[1] Other test methods/test specifications, standardised or internal, may be agreed upon with the Society prior to testing.

4.5 Requirements to packaging and marking of product

The product or package is to be marked. The marking shall at least include the following information:

— manufacturer's name or trade mark
— production plant
— product name (grade)
— storage instruction
— production date.

The marking is to be carried out in such a way that it is visible, legible and indelible. The product name shall be the same as stated on the DNV Type Approval Certificate (ref. item 1 in section 3).