



DET NORSKE VERITAS TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. K-3856

This Certificate consists of 4 pages

This is to certify that the

Sandwich Core Materials

332.40

with type designation(s)

NidaFusion SXO

Manufactured by

STRUCTISO sarl

Aniche, France

is found to comply with

Det Norske Veritas' Rules for Classification of High Speed, Light Craft and Naval Surface Craft

Det Norske Veritas' Tentative Rules for Certification and Classification of Boats 1997

Det Norske Veritas' Standards for Certification No. 2.21, Craft, 2008

Det Norske Veritas' Rules for Certification of Life Boats 1998

Det Norske Veritas' Standards for Certification No. 2.20, Lifeboats and Rescue Boats, 2007

Application

Core material for sandwich construction.

Area of application will be evaluated during approval of classified objects.

Place and date
Høvik, 2009-09-11

This Certificate is valid until
2013-12-31

for Det Norske Veritas AS

Helge Drange
Head of Section

Local Office
DNV Dunkerque

Gisle Hersvik
Surveyor

Product description

NidaFusion SXO; Sandwich Core Material

- Nida-Core NidaFusion is a core material of glass fibers forming a pattern of triangulations that join opposing skin laminations of a sandwich structure.

- NidaFusion is created by insertion of glass fibers through a closed cell foam material thereby establishing the fiber architecture that may then be infused with resin simultaneously with the fabrication and integration with the skin laminates.

- NidaFusion SXO incorporates fiber insertions on three axes in order to confer quasi-isotropic properties.

- Alternative insertion frequency, out of plane insertion angle, and fiber tex govern the mechanical properties.

The following manufacturer's specified values are confirmed by testing:

Properties	Test	NidaFusion SXO				
	Method					
Density, dry foam, 20°C	ISO 845	34,7			kg/m ³	msmv
Density, dry foam, 20°C	ISO 845	36,2			kg/m ³	msv
Density, infused core, 20°C	ISO 845	126,0			kg/m ³	msmv
Density, infused core, 20°C	ISO 845	142,1			kg/m ³	msv
Tensile strength, 20°C	ASTM C297	0,95			MPa	msmv
Tensile strength, 20°C	ASTM C297	1,05			MPa	msv
Tensile modulus, 20°C	ASTM C297	104			MPa	msv
Tensile modulus, 20°C	ASTM C297	68			MPa	msmv
Compressive strength, 20°C	ISO 844	2,4			MPa	msmv
Compressive strength, 20°C	ISO 844	2,8			MPa	msv
Compressive modulus, 20°C	ISO 844	153			MPa	msv
Compressive modulus, 20°C	ISO 844	141			MPa	msmv
Shear strength, 20°C - 0°/45°/90°	ISO 1922	0,45	0,85	0,41	MPa	msmv
Shear strength, 20°C - 0°/45°/90°	ISO 1922	0,66	0,89	0,83	MPa	msv

Shear modulus, 20°C - 0°/45°/90°	ISO 1922	37,6	45,3	37,6	MPa	msv
Shear modulus, 20°C - 0°/45°/90°	ISO 1922	32,5	43,1	30,3	MPa	msmv
Shear elongation, 20°C - 0°/45°/90°	ISO 1922	0,8	0,8	0,8	%	msmv
Water absorption, 1 week	ISO 2896		0,203		kg/m ³	mean
Heat resistance, % retention of shear strength, 50°C	ASTM C393		84		%	
Water resistance, % retention of shear strength, 20°C	ASTM C393		100		%	

Remarks:

Values are based on testing with 25 mm thickness of NidaFusion SXO.

Shear elongation figures based on peak stress, not ultimate limit.

Legends:

msmv = Manufacturer's Specified Minimum Value

msv = Manufacturer's Specified Value (average value at average density)

mean = Mean of Type Test results

Application/LimitationIn general and for compliance with tentative Rules for Boats:

- The uses of core materials for hull applications are to be approved in each individual case. Documentation of additional material properties may be required.

For compliance with DNV Rules for High Speed, Light Craft and Naval Surface Craft:

- The uses of core materials for hull applications are limited by the shear and compression strength figures in Rules for Classification of HS, LC and NSC, Pt.3, Ch.4, Sec.5 A, Table 1.
- Approved maximum thickness: 25 mm. if larger thickness is to be used, documentation of additional material properties may be required.

Type Approval documentation**Tests carried out**

Type Testing carried out according to **Type Approval documentation**, ref. Test Report No. L 208 108-1, Revision 9, "Nida-Core SXO(*) Characterization (*)ISOTROPIC STRUCTISO" from Pôle de Plasturgie de L'est (PPE), Saint-Avold, France of 2009-08-20

Build-up of test specimens

Core:

NidaFusion SXO 25 mm thick, step 20 mm, PU-foam, triangulations 3x1200 tex following 0°, +120°, -120°, integrated skin 450 g/m² continuous strand mat

Skins:

NCF +/-45°, 600 g/m², 1 layer each side

Resin:

Vinylester, Derakane 470-36S, 240 cp

Manufacturing process:

Vacuum Infusion with flow media

Marking of product

Product shall be marked with *manufacturer's name*; **STRUCTISO sarl, Aniche, France** and *type designation*.

Certificate Retention/Renewal Survey

The scope of the Retention/Renewal Survey is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Survey to be performed after two (2) years (Certificate Retention Survey) and at renewal after four (4) years (Certificate Renewal Survey).

The main elements of the survey are:

*0 Ensure that **Type Approval documentation** is available.

*1 Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.

*2 Ensure traceability between manufacturer's product marking and the DNV Type Approval Certificate.

END OF CERTIFICATE

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

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