DNV·GL

Certificate No:
TAK00001HY

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Carbon Fibre Products

with type designation(s)
Quad-axials (0°/±45°/90°) - (200-2000 g/m²)

Issued to
Sigmatex UK Limited
Runcorn, Cheshire, United Kingdom

is found to comply with
DNV GL class programme DNVGL-CP-0434 – Type approval – Uni- and multi-axial multi-ply fabrics made of carbon fibres
DNV GL rules for classification – High speed and light craft
DNV GL standard DNVGL-ST-0342 – Craft
Det Norske Veritas' Standards for Certification No. 2.20, Lifeboats and Rescue Boats, 2007

Application :

For use in marine vessels according to stated Rules/Standards.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2019-02-22**
This Certificate is valid until **2024-02-21**.
DNV GL local station: **Manchester**

Approval Engineer: **Gisle Hersvik**

for **DNV GL**

Rikard Törnqvist
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Job Id: **262.1-008471-6**
Certificate No: **TAK00001HY**

Product description

Quad-axials (0°/±45°/90°) - (200-2000 g/m²); Quad-axial Carbon Fibre fabrics.

The following indicative properties have been verified by Type Testing of laminates prepared using the liquid resin infusion method:

Property	**Test Method**	**MCX216 1270**		
Tensile Strength – ±45º	ISO 527–4	927	MPa	mean
Tensile Modulus – ±45º	ISO 527–4	62.1	GPa	msv
Tensile Elongation – ±45º	ISO 527–4	-	%	mean / msmv
Compressive Strength – ±45º	ISO 14126	506	MPa	mean
Compressive Modulus – ±45º	ISO 14126	62.8	GPa	msv
Compressive Elongation – ±45º	ISO 14126	-	%	mean / msmv
Fibre content (by volume)	-	~55	%	mean
Resin	Araldite® LY 564/Araldite® HY 2954 Epoxy Resin			
Curing Procedure for Type Testing	Curing in autoclave: -Heat at 2 °C/min to 60 °C -Hold at 60 °C for 120 mins -Heat at 2 °C/min to 120 °C -Hold at 120 °C for 120 mins -Cool at 2 °C/min to 60 °C			

Legends:
msmv = Manufacturer's Specified Minimum Value (verified to be below mean - 2 std. deviation of Type Test results)
msv = Manufacturer's Specified Value (verified to be within mean ±10% of Type Test results)
mean = Mean of Type Test results

Place of manufacture

Sigmatex (UK) Limited, Manor Farm Road, Norton, Runcorn, WA WA7 1TE, United Kingdom

Application/Limitation

Manufacture of FRP components for applications including marine vessels - and rotor blades within wind energy (ref. DNVGL-ST-0376).

The fabric complies with the applicable requirements of DNV GL and is compatible to the laminating resin.

Any significant changes in design and / or quality of the material will render the approval invalid.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

Product shall be marked with *manufacturer's name;* **Sigmatex (UK) Limited** and *type designation*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV GL Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment 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.

Periodical Assessment to be performed after 2 and 3.5 years (Certificate Retention) and at renewal after 5 years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- 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.
- Ensure traceability between manufacturer's product marking and the DNV GL Type Approval Certificate.

END OF CERTIFICATE