

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Carbon Fibre Products**

with type designation(s)

Carbon biax45 ($\pm 45^\circ$): 200-1200 g/m²,**Carbon biax0/90 (0°/90°): 100-2000 g/m²**

Issued to

**Vitrulan Composites Oy, Mikkeli Plant
MIKKELI, Finland**

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 :****Manufacturing of FRP laminates.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**Issued at **Høvik** on **2020-02-03**This Certificate is valid until **2023-12-10**.DNV GL local station: **Helsinki FIS**for **DNV GL**Approval Engineer: **Gisle Hersvik**

**Gustav Heiberg
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.



Job Id: **262.1-029926-2**
Certificate No: **TAK00001F1**
Revision No: **1**

Product description

Carbon Fibre products of $\pm 45^\circ$ and $0^\circ/90^\circ$ orientations.

Carbon biax45 ($\pm 45^\circ$): 200-1200 g/m²,
Carbon biax0/90 ($0^\circ/90^\circ$): 100-2000 g/m²

- Fibre material: Torayca® T700SC-12K-F0E

The following indicative properties have been verified by Type Testing of laminates:

Property	Test Method	Carbon biax45 600		
Tensile Strength	DIN EN ISO 527-4	1006	MPa	mean
Tensile Modulus	DIN EN ISO 527-4	61	GPa	mean
Compressive Strength	DIN EN ISO 14126	740	MPa	mean
Compressive Modulus	DIN EN ISO 14126	60	GPa	mean
Flexural Strength	DIN EN ISO 14125	805	MPa	mean
Flexural Modulus	DIN EN ISO 14125	44	GPa	mean
Fibre content	DIN EN 2564	53,7	%	mean
Resin/Hardener		AME™ 60001 INF-135 (epoxy vinyl ester resin) (Ashland) Norox® MCP-75 (United Initiators)		
Curing Procedure for Type Testing		24 hrs at ambient room temperature + 12 hrs at 65°C		

Legends:

mean = Mean of Type Test results

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*; **Vitrulan Composites Oy, Mikkeli Plant, Finland** 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.



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Periodical assessments (for Certificate Retention and Certificate Renewal) shall be performed according to DNVGL-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnvgl.com>

END OF CERTIFICATE