

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

Woven Fabrics, Carbon Woven (160-660 g/m²)

Issued to

**DowAksa Ileri Kompozit Malzemeler San. Ltd. Sti.
Beyoğlu, İstanbul, Turkey**

is found to comply with

DNV GL rules for classification – High speed and light craft**Det Norske Veritas' Type Approval Programme 1-501.19, 2009, Carbon Fibre Reinforcements****DNV GL standard DNVGL-ST-0342 – Craft****Det Norske Veritas' Standards for Certification No. 2.20, Lifeboats and Rescue Boats, 2007****Application :****Manufacture 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 **2019-10-23**for **DNV GL**This Certificate is valid until **2024-10-22**.DNV GL local station: **Istanbul**Approval Engineer: **Gisle Hersvik****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.



Product description

Woven Fabrics, Carbon Woven (160-660 g/m²): Woven carbon fibre fabrics of bi-axial orientations.

- Weave structure: 2x2 twill
- Fibre material: 12K
- DW XXX, 'XXX' is the areal weight in g/m².

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

Property	Test Method	DW 660		
Tensile Strength	DIN EN ISO 527-4,5	769	MPa	mean
Tensile Modulus	DIN EN ISO 527-4,5	63	GPa	mean
Compressive Strength	DIN EN 2850 B	358	MPa	mean
Compressive Modulus	DIN EN 2850 B	57	GPa	mean
Flexural Strength	DIN EN ISO 14125	571	MPa	mean
Flexural Modulus	DIN EN ISO 14125	-	GPa	mean
Fibre content (FVF)	DIN EN 2559	52.1	%	mean
Resin/Hardener	DURATEK 1200. DTE 1200 resin + DTS 1151 hardener.			
Curing Procedure for Type Testing	24 hours at ambient temperature and 8 hours at 100°C			

FVF: Fibre Volum Fraction

Legends:

mean = Mean of Type Test results

Application/Limitation

Manufacture of FRP components for applications including marine vessels. The products' suitability in rotor blades within wind energy (ref. DNVGL-ST-0376) to be evaluated on a case-by-case basis.

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

1. Assessment Report from DNV GL Istanbul of 2091-09-10.
2. DowAksa Test Report No. 2019-88 "DNV GL Type Approval Certification".
3. TDS for DowAksa 12K A-49 (D012).
4. TDS for DURATEK 1200 - Series (DNV GL SoA WP 1620031 HH).
5. DowAksa Test Programme and "DNVGL TİP ONAY SERTİFİKASYONU".
6. "Declaration & Confirmation of Asbestos-Free Products" from DowAksa of 2019-09-12.
7. Application for Type Approval of 2019-07-12.

Tests carried out

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

Please note that the type testing and approval has been carried out with basis in DNV Type Approval Programme No. 1-501.19 as the DNVGL-CP-0434 is not specifically made for woven carbon fibre fabrics.

Job Id: **262.1-031951-1**
Certificate No: **TAK00001TB**

Marking of product

Product shall be marked with *manufacturer's name*; **DowAksa Ileri Kompozit Malzemeler San. Ltd. Sti., Turkey** 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 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.

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