

# TYPE APPROVAL CERTIFICATE

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## This is to certify:

**That the Glass Fibre Products**

with type designation(s)

**Dongsung HiMax Quadriaxial Facrics: DBLT (0°/+45°/90°/-45°) (600 - 1200 g/m<sup>2</sup>)**

Issued to

**Dongsung Advanced Materials Co., Ltd.**  
**Hwaseong-si, Gyeonggi-do, Republic of Korea**

is found to comply with

**DNV class programme DNV-CP-0467 – Type approval – Uni- and multi-axial multi-ply fabrics made of glass fibres**

**DNV rules for classification – High speed and light craft**

**DNV standard DNV-ST-0342 – Craft**

## Application :

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**For use in marine vessels in accordance with stated Rules/Standards.**

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

Issued at **Hamburg** on **2023-07-16**

This Certificate is valid until **2028-07-15**.

DNV local unit: **Seoul**

for **DNV**

Approval Engineer: **Gisle Hersvik**

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**Thorsten Lohmann**  
**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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



## Product description

### Dongsung HiMax Quadri-axial Glass Fibre Products of 0°/+45°/90°/-45° orientations:

- E-glass quadri-axial stitched fabrics
- DBLT (0°/+45°/90°/-45°) (600 - 1200 g/m<sup>2</sup>)

#### Legends:

L: Longitudinal  
T: Transverse  
DB: Double Bias

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

| Property                                                | Test Method | DBLT1000                                                           |     |      |
|---------------------------------------------------------|-------------|--------------------------------------------------------------------|-----|------|
| Tensile Strength - 45°                                  | ISO 527     | 313                                                                | MPa | mean |
| Tensile Modulus - 45°                                   | ISO 527     | 15.5                                                               | GPa | mean |
|                                                         |             |                                                                    |     |      |
| Flexural Strength - 45°                                 | ISO 14125   | 386                                                                | MPa | mean |
| Flexural Modulus - 45°                                  | ISO 14125   | 8.89                                                               | GPa | mean |
|                                                         |             |                                                                    |     |      |
| Fibre content (by weight)                               | ISO 1172    | 53.1                                                               | %   | mean |
| Fibre volume fraction, FVF                              | -           | 32.39                                                              | %   | mean |
|                                                         |             |                                                                    |     |      |
| Resins                                                  |             | Unsaturated Polyester: PolyStar R235<br>(Sewon Chemical Co., Ltd.) |     |      |
| Curing Procedure for Type Testing                       |             | 24 hrs at ambient temperature, 3 hrs at 80°C                       |     |      |
| <i>Legend:</i><br>mean      = Mean of Type Test results |             |                                                                    |     |      |

## Applications/Limitations

The approval covers the weight ranges given above.

The fabric complies with the applicable requirements of DNV 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

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 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 assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-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.dnv.com>

END OF CERTIFICATE