

# TYPE APPROVAL CERTIFICATE

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

with type designation(s)

**Multi-layer fabrics. Bi-axials (EBLT, EBX, ECW): Woven Rovings (300-900 g/m<sup>2</sup>) + CSM (100-600 g/m<sup>2</sup>)**

Issued to

**Taishan Fiberglass Inc.**  
**TAIAN, SHANDONG, China**

is found to comply with

**DNV GL class programme DNVGL-CP-0467 – Type approval – Uni- and multi-axial multi-ply fabrics made of glass fibres****Det Norske Veritas' Type Approval Programme 1-501.8, 2009, Glass Fibre Reinforcements****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 in accordance with 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 **2018-09-10**This Certificate is valid until **2023-09-09**.DNV GL local station: **Qingdao**for **DNV GL**Approval Engineer: **Gisle Hersvik**

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**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

### Multi-layer fabric based rovings

Bi-axials; **EBLT**, **EBX** and **ECW** Woven Rovings (300-900 g/m<sup>2</sup>) + CSM (100-600 g/m<sup>2</sup>) glass fibre products:

|                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(0°/90°):</b><br>EBLT540(0,90)C150UP,<br>EBLT600(0,90)C200UP, EBLT600(0,90)C225UP, EBLT600(0,90)C300UP, EBLT600(0,90)C450UP<br>EBLT760(0,90)C300UP,<br>EBLT800(0,90)C225UP, EBLT800(0,90)C300UP, EBLT800(0,90)C450UP |
| <b>(+45°/-45°):</b><br>EBX600(-45/+45)C225UP,<br>EBX800(-45/+45)C225UP,<br>EBX600(-45/+45)C300UP                                                                                                                        |
| ECW300(90),<br>ECW300C/300W, ECW300C/500W, ECW450C/500W, ECW300C/570W, ECW450C/570W,<br>ECW300C/600W, ECW450C/600W, ECW450C/800W, ECW300C/800W                                                                          |

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

| Property – Orientation                                                                                                                                                                                                                                                                        | Test Method | EBLT800(0/90)C450UP                         |      |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------|------|-----|
| Tensile Strength – 0°                                                                                                                                                                                                                                                                         | ISO 527     | 139,1                                       | msmv | MPa |
| Tensile Modulus – 0°                                                                                                                                                                                                                                                                          | ISO 527     | 11,7                                        | msv  | GPa |
| Tensile Elongation – 0°                                                                                                                                                                                                                                                                       | ISO 527     | 1,5                                         | msmv | %   |
|                                                                                                                                                                                                                                                                                               |             |                                             |      |     |
| Flexural Strength – 0°                                                                                                                                                                                                                                                                        | ISO 14125   | 189,7                                       | msmv | MPa |
| Flexural Modulus – 0°                                                                                                                                                                                                                                                                         | ISO 14125   | 10,0                                        | msv  | GPa |
| Flexural Deflection – 0°                                                                                                                                                                                                                                                                      | ISO 14125   | -                                           | msmv | %   |
|                                                                                                                                                                                                                                                                                               |             |                                             |      |     |
| Tensile Strength – 90°                                                                                                                                                                                                                                                                        | ISO 527     | 109,1                                       | msmv | MPa |
| Tensile Modulus – 90°                                                                                                                                                                                                                                                                         | ISO 527     | 12,3                                        | msv  | GPa |
| Tensile Elongation – 90°                                                                                                                                                                                                                                                                      | ISO 527     | 1,2                                         | msmv | %   |
|                                                                                                                                                                                                                                                                                               |             |                                             |      |     |
| Flexural Strength – 90°                                                                                                                                                                                                                                                                       | ISO 14125   | 185,6                                       | msmv | MPa |
| Flexural Modulus – 90°                                                                                                                                                                                                                                                                        | ISO 14125   | 10,4                                        | msv  | GPa |
| Flexural Deflection – 90°                                                                                                                                                                                                                                                                     | ISO 14125   | -                                           | msmv | %   |
|                                                                                                                                                                                                                                                                                               |             |                                             |      |     |
| Glass Fibre content                                                                                                                                                                                                                                                                           | ISO 1172    | 41,3                                        | mean | %   |
| Resin                                                                                                                                                                                                                                                                                         |             | Crystic 272E(polyester resin) (Scott Bader) |      |     |
| Curing Procedure for Type Testing                                                                                                                                                                                                                                                             |             | 24 hrs at room temperature, 16 hrs at 40°C  |      |     |
| Note:<br>Curing procedure is different from what is given in DNV Type Approval Programme No. 1-501.8.                                                                                                                                                                                         |             |                                             |      |     |
| Legend:<br><i>msmv</i> = Manufacturer's Specified Minimum Value, verified to be below mean - 2 x standard deviation of Type Test results<br><i>msv</i> = Manufacturer's Specified Value, verified to be within ± 10% of mean of Type Test results.<br><i>mean</i> = Mean of Type Test results |             |                                             |      |     |

## Application/Limitation

The Type Approval is valid for the nominal weight variants; 300 to 900 g/m<sup>2</sup>.

## Type Approval documentation

### Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**, ref. LR's Materials and NDE Department Technical Report No. 07/4151 of October 2007.

Note that the DNV GL Class Programme DNVGL-CP-0467 – Type approval – Uni- and multi-axial multi-ply fabrics made of glass fibres, is not dedicated for woven roving based products, hence the DNV TAP No. 1-501.8 may be used as reference for this kind of products until a specific DNVGL-CP is established for woven roving products.

### Marking of product

Product shall be marked with *manufacturer's name*: **Taishan Fiberglass Inc., Shandong, China** 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