

TYPE APPROVAL CERTIFICATE

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

with type designation(s)

Chopped Strand Mats; TIANMA EMC100, EMC225, EMC300, EMC450 and EMC600

Issued to

Changzhou Tianma Group Co.,Ltd (Building Materials No.253 plant)**CHANGZHOU JIANGSU, 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**DNV GL rules for classification – High speed and light craft****Det Norske Veritas Standards' for Certification No. 2.21, Craft, 2010****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.**This Certificate is valid until **2021-06-06**.Issued at **Høvik** on **2016-06-07**DNV GL local station: **Nanjing**Approval Engineer: **Helene Bjerke**for **DNV GL**

Arnstein Gloppen
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

Chopped Strand Mats; **TIANMA EMC100, EMC225, EMC300, EMC450 and EMC600.**

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

Property	Test Method	EMC 100	EMC 225	EMC 300		
Tensile Strength – Long.	ISO 527	80	103	99	MPa	msmv
Tensile Modulus – Long.	ISO 527	7609	9582	10 381	MPa	msv
Tensile Elongation – Long.	ISO 527	1,5	1,6	1,5	%	msmv
Tensile Strength – Transv.	ISO 527	83	103	98	MPa	msmv
Tensile Modulus – Transv.	ISO 527	7314	10304	10 362	MPa	msv
Tensile Elongation – Transv.	ISO 527	1,6	1,5	1,5	%	msmv
Glass content	ISO 1172	26,62	33,50	30,6	%	mean

Property	Test Method		EMC 450	EMC 600		
Tensile Strength – Long.	ISO 527		139	107	MPa	msmv
Tensile Modulus – Long.	ISO 527		11 141	10241	MPa	msv
Tensile Elongation – Long.	ISO 527		1,8	1,4	%	msmv
Tensile Strength – Transv.	ISO 527		126	112	MPa	msmv
Tensile Modulus – Transv.	ISO 527		12 130	10395	MPa	msv
Tensile Elongation – Transv.	ISO 527		1,6	1,5	%	msmv
Glass content	ISO 1172		30,7	32,78	%	mean
Resin		TM-107L				
Curing procedure for Type Testing		24 hrs at room temperature, 72 hrs at 50 °C				

msmv = Manufacturer's Specified Minimum Value (verified to be below mean - 2 standard deviation of Type Test results)

msv = Manufacturer's Specified Value

mean = Mean of Type Test results

Type Approval documentation

- 1.
- 2.

Tests carried out

Type Testing carried out according to **Type Approval documentation.**

Marking of product

Product shall be marked with *manufacturer's name*; **Changzhou Tianma Group Co., Ltd., Jiangsu, China** and *type designation*; **TIANMA EMC100, EMC225, EMC300, EMC450, EMC600.**

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.



Job Id: **262.1-013497-2**
Certificate No: **TAK00000BD**

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

The main elements of the Periodical Assessment are:

- 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