

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Gelcoats and Topcoats**with type designation(s)
TIANMA TM-31 (Gelcoat)

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-0083 – Type approval – Polyester resin, vinylester resin, gelcoat and topcoat**DNV GL rules for classification – High speed and light craft****Det Norske Veritas Standards' for Certification No. 2.21, Craft, 2010****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.



Job Id: **262.1-013497-2**
Certificate No: **TAK00000BE**

Product description

TIANMA TM-31; thixotropic unsaturated isophthalic polyester gelcoat resin.

The following properties have been verified by Type Testing of cured resin samples:

Properties	Test Method	Results		
Tensile Strength	ISO 527	63	MPa	msmv
Fracture Elongation	ISO 527	2.6 / 2.0	%	mean / msmv
Water Absorption	ISO 62	69	%	msmv
HDT	ISO 75	73	°C	msmv
Barcol Hardness	ASTM D 2583	40	-	msv
Density	ISO 1675	1.11	g/cm ³	msv
Curing procedure used for Type Testing		24 hrs at room temperature, 24 hrs at 50°C		

Legends:

mean = Mean of Type Test results.

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

msv = Manufacturer's Specified Value, verified to be within $\pm 10\%$ of 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 TM 31**.

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.

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