

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Polyester Resins**

with type designation(s)  
**TM-107**

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 – Ships**

**Application :**

**Grade 1 resin 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 GL.**

Issued at **Hamburg** on **2020-08-12**

This Certificate is valid until **2025-08-11**.

DNV GL local station: **Nanjing NB & CMC**

for **DNV GL**

Approval Engineer: **Gabi Dau**

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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 GL AS, its parent companies and subsidiaries as well as their officers, directors and employees ("DNV GL") 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.



Job Id: **262.1-032451-1**  
Certificate No: **TAK00001XS**

## Product description

Unsaturated polyester resin, Grade 1  
TM-107 mix ratio M<sub>50</sub>: 2%, E<sub>1</sub>: 1,5%

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

|                             | Standard                      | TM-107 |                |
|-----------------------------|-------------------------------|--------|----------------|
| Density                     | ISO 1675 [g/cm <sup>3</sup> ] | 1.36   | measured value |
| Tensile Strength            | ISO 527-1,2 [MPa]             | 85.98  | mean           |
| Fracture elongation         | ISO 527-1,2 [%]               | 5.76   | mean           |
| Barcol hardness             | ASTM D2583 / EN 59 [-]        | 44     | msv            |
| Heat deflection temperature | ISO 75-2 [°C]                 | 90.50  | mean           |
| Water absorption            | ISO 62 [mg]                   | 75.40  | mean           |
| curing procedure            | 24h at 23°C, 24h at 60°C      |        |                |

Legends:

mean = Mean of Type Test results

msv = Manufacturer's Specified Value, verified to within  $\pm 10\%$  of mean of Type Test results.

## Limitation

Any significant changes in design and / or quality of the material will render the approval invalid.

## Type Approval documentation

### Assessed production site

### 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.** and *type designation*.

### Periodical assessment

Periodical assessments for type approvals with a validity period of five years will be required after 2 years and after 3.5 years.

If an approval of manufacturer certificate which is still valid for at least one year is available, an exemption from the obligation concerning retention and renewal surveys listed in the class programme will apply.

END OF CERTIFICATE