DNV·GL

Certificate No:
TAK00000N1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sandwich Adhesives

with type designation(s)
ETERSET 2978PT

Issued to
Eternal Materials Co., Ltd.
Kaohsiung, Taiwan

is found to comply with
DNV GL class programme DNVGL-CP-0085 – Type approval – Sandwich adhesives
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 :

Grade 1 sandwich adhesive for use in marine vessels according to stated Rules/Standards. Area of application will be evaluated during approval of classified objects.

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

This Certificate is valid until **2022-01-26**.

Issued at **Høvik** on **2017-01-27**
DNV GL local station: **Kaohsiung** for **DNV GL**

Approval Engineer: **Gisle Hersvik**

Martin Strande
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.

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Product description

ETERSET 2978PT; Pre-promoted ISO type Unsaturated Polyester (UP) resin based adhesive for sandwich construction.

The following values have been given by the manufacturer based on type testing:

Properties	**Test Method**	**ETERSET 2978PT**		
Tensile strength, +23°C	ASTM C297	6.6 / 3.0	MPa	mean / msmv
Tensile strength, +45°C	ASTM C297	3.0 / 2.4	MPa	mean / msmv
Tensile strength, -10°C	ISO 527-1/4	16.8 / 12.0	MPa	mean / msmv
Tensile strength, 0°C	ISO 527-1/4	16.7 / 9.0	MPa	mean / msmv
Tensile strength, +23°C	ISO 527-1/4	9.4 / 6.0	MPa	mean / msmv
Tensile strength, +45°C	ISO 527-1/4	3.68 / 3.0	MPa	mean / msmv
Fracture elongation, -10°C [1)]	ISO 527	1.2 / 1.1	%	mean / msmv
Fracture elongation, 0°C	ISO 527	1.6 / 1.3	%	mean / msmv
Fracture elongation, +23°C	ISO 527	8.7 / 6.0	%	mean / msmv
Fracture elongation, +45°C	ISO 527	21.0 / 15.0	%	mean / msmv
Shear strength, +23 °C	ISO 1922	2.47 / 1.0	MPa	mean / msmv
Water resistance: Retained strength after 4 weeks in sea water	ASTM C297	5.9 / 2.4	MPa	mean / msmv

mean: mean of type test results.
msmv: manufacturer's specified minimum value, verified to be less than mean – 2 standard deviations.

[1)] Fracture elongation (msmv = 1.0%) at -10°C is below the requirement of min. 2.0% for a Grade 1 sandwich adhesive. Ref. DNVGL-RU Ship Pt.2 Ch.3.

Application/Limitation

Designing with this sandwich adhesive shall be done with reference to the below deviations from DNV GL Rules and DNVGL-CP-0085.

The tensile/fracture elongation at -10°C is below DNV GL Rules requirement of 2.0% for Grade 1, and the use in hull structures/critical applications will therefore be evaluated during approval of classified objects.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

Product/package shall be marked with *manufacturer's name*; **Eternal Materials Co., Ltd., Taiwan** and *type designation;* ***ETERSET 2978PT***.

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 DNV GL Type Approval Certificate.

END OF CERTIFICATE