

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sandwich Core Materials

with type designation(s)
FLEXOKORE

Issued to

Fadelma Cia. Ltda.
GUAYAQUIL, Ecuador

is found to comply with
GL Rules for Classification and Construction II - Materials and Welding Part 2 - Non-metallic Materials

Application :

Manufacturing of sandwich-structured composite.

Issued at **Hamburg** on **2017-12-14**

for **DNV GL**

This Certificate is valid until **2022-12-13**.

DNV GL local station: **Hamburg Materials & Welding**

Approval Engineer: **Guido Michalek**

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.



Product description

End Grain Balsa Wood

Approved variants

FLEXOKORE with a nominal density of 150 kg/m³.

Approved range: 130 – 160 kg/m³

Material Properties

| Variant | Nominal Density (1) | Compr. Strength (2) | Compr. Modulus (2) | Compr. Strength (3) | Compr. Modulus (3) | Shear Strength (4) | Shear Modulus (4) |
|-----------|------------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|----------------------|
| FLEXOKORE | 150 | 15.8 (14.8) | 3990 (3252) | 0.75 (0.59) | 122 (50) | 2.84 (2.66) | 169 (145) |

(1) Nominal Density according to ISO 845 in kg/m³

(2) Compressive behavior parallel to the grain in accordance with ISO 844:2014, procedure B in MPa.

(3) Compressive behavior perpendicular to the grain in accordance with ISO 844:2014, procedure B in MPa.

(4) Shear behavior in accordance with ISO 1922 in MPa.

All values are average values based on nominal density $\pm 5\%$ and verified by testing. The values within brackets are minimum values on the basis of average – 2 stdv.

Limitation

The balsa wood complies with the applicable requirements of DNV GL and is compatible to the laminating resin and/or adhesive. Any significant changes in design and / or quality of the material will render the approval invalid.

Type Approval documentation

- Technical Data Sheet
- Test Report No. CTE-REP-035 issued by Composite Test & Evaluation Ltd., dated 07. March 2013.
- Test Report No. 20160305 issued by Beijing FRP Testing Laboratory, dated on 11. October 2016.
- Test Report No. 20150435 issued by Shanghai FRP Testing Laboratory, dated on 22. May 2015.
- Workshop Inspection Report, issued by DNV GL Lima, Peru.

Assessed production site

Fadelma Cia Ltda.
9.5km via Duran-Tambo
Guayaquil
Ecuador

Periodical assessment

A production site with a valid Approval of Manufacturer (AoM) certificate for material in question is exempted from the obligation concerning retention and renewal assessments.

For manufacturer without a valid AoM a periodical assessment after 2.5 years and at renewal after 5 years is required.

Remarks

This certificate supersedes the Type Approval WP 1310004 HH.

END OF CERTIFICATE