DNV·GL

Certificate No:
**TAK00001W9**

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Sandwich Core Materials**

with type designation(s)
**FLEXcell - F series**

Issued to
**MARICELL S.R.L.**
**Longarone, Italy**

is found to comply with
**DNV GL class programme DNVGL-CP-0084 – Type approval – Sandwich core materials**

## Application :

**Production of sandwich structured composites**

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

Issued at **Hamburg** on **2020-05-27**
This Certificate is valid until **2025-05-26**.
DNV GL local station: **Italy/Malta CMC**

Approval Engineer: **Joachim Rehbein**

for **DNV GL**

**Thorsten Lohmann**

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.



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Job Id: **262.1-033406-1**
Certificate No: **TAK00001W9**

## Product description

A cross-linked, closed-cell PVC (Polyvinyl Chloride)-foam core material for sandwich construction.

## Approved variants

- FLEXcell F060
- FLEXcell F080
- FLEXcell F100
- FLEXcell F130

## Material Properties

| Variant | Nominal Density (1) | Density Range (1) | Compr. Strength (2) | Compr. Modulus (2) | Shear Strength (3) | Shear Modulus (3) | Elongation at Peak (4) | HRT (5) | Tensile Strength (6) | Tensile Modulus (6) |
|---|---|---|---|---|---|---|---|---|---|---|
| F060 | 60 | 54 - 69 | 0.77 (0.53) | 58 (40) | 0.77 (0.50) | 19 (14) | 39 | n.a. | 1.45 (1.20) | 52 (40) |
| F080 | 80 | 72 – 92 | 1.31 (0.84) | 91 (59) | 1.06 (0.80) | 25 (16) | 51 | n.a. | 1.83 (1.50) | 69 (50) |
| F100 | 100 | 90 – 115 | 1.70 (1.00) | 103 (70) | 1.60 (1.00) | 39 (24) | 49 | n.a. | 2.00 (1.70) | 87 (70) |
| F130 | 130 | 120 - 150 | 2.42 (1.80) | 150 (110) | 1.99 (1.50) | 47 (33) | 52 | 47 | 3.14 (2.70) | 121 (100) |

(1) Density according to ISO 845 in kg/m³
(2) Compressive properties according to ISO 844:2014, procedure B in MPa.
(3) Shear properties according to ISO 1922 in MPa.
(4) Shear elongation at peak according to ISO 1922 in %.
(5) Heat Resistance temperature (HRT) in °C where the shear strength is > 80% of the shear at RT.
(6) Tensile properties according to ASTM D 1623 in MPa.

All values are average values and verified by testing. The values within brackets are minimum values.

## Limitation

The foam 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 FLEXcell-TDS1 20200117;
- Workshop Inspection Report issued by DNV GL Venice, dated 2018-05-09;
- Test Report No. 1536-20 with annex, issued by Linset & Co. S.r.l., and based on tests witnessed by DNV GL, dated 2020-02-12;
- Quality documentation.

## Assessed production site

Maricell S.r.l.
Via Villanova 15
32013 Longarone
Italy

## Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVGL-CP-0338.

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.

## Remarks

ASTM D 1621-73 procedure B and ISO 844:2014 procedure B work on the same technical principle and provide comparable test results.

ASTM C 273 and ISO 1922 work on the same technical principle and provide comparable test results.

END OF CERTIFICATE