



TYPE APPROVAL CERTIFICATE

Certificate no.:
TAK00001DV
Revision No:
1

This is to certify:

that the **Sandwich Core Materials**

with type designation(s)
Strucell P-Series

issued to

Changzhou Tiansheng Composite Materials Co., Ltd.
Changzhou, China

is found to comply with

DNV class programme DNV-CP-0084 – Type approval – Sandwich core materials
DNV rules for classification – High speed and light craft
DNV standard DNV-ST-0342 – Craft

Application:

Core material for sandwich construction.

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

Issued at **Hamburg** on **2024-06-14**

This Certificate is valid until **2029-03-25**.

for **DNV**

DNV local unit: **Nanjing NB & CMC**

Approval Engineer: **Gisle Hersvik**

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



Product description

Strucell P-Series

A closed-cell, crosslinked, rigid PVC (Polyvinyl Chloride) foam core material for FRP sandwich constructions.

The following manufacturer's specified values are confirmed by type testing:

Properties	Test Method	Strucell							Unit	
		P45	P60	P80	P100	P130	P200	P250		
Density (Nominal)	ISO 845	48	60	80	100	130	200	250	kg/m ³	msv
Density	ISO 845	43	54	72	90	120	180	225	kg/m ³	msmv
Tensile strength	ASTM C297	1.4	1.8	2.5	3.5	4.5	7.1	9.2	MPa	msv
Tensile strength	ASTM C297	1.1	1.5	2.2	2.5	3.5	6.3	8.0	MPa	msmv
Tensile modulus	ASTM C297	55	75	95	130	175	250	360	MPa	msv
Tensile modulus	ASTM C297	45	57	85	105	135	210	320	MPa	msmv
Compressive strength	ISO 844	0.6	0.93	1.4	2.0	3.0	4.8	6.2	MPa	msv
Compressive strength	ISO 844	0.5	0.7	1.15	1.65	2.4	4.2	5.4	MPa	msmv
Compressive modulus	ISO 844	50	70	90	135	170	240	300	MPa	msv
Compressive modulus	ISO 844	45	60	80	115	145	200	240	MPa	msmv
Shear strength	ISO 1922	0.5	0.76	1.15	1.44	2.1	3.5	4.0	MPa	msv
Shear strength	ISO 1922	0.46	0.63	0.95	1.4	1.9	3.2	3.9	MPa	msmv
Shear modulus	ISO 1922	15	20	27	35	50	85	104	MPa	msv
Shear modulus	ISO 1922	12	16	23	28	40	75	88	MPa	msmv
Shear elongation, at break	ISO 1922	10	20	30	25	25	30	30	%	msv
Shear elongation, at break	ISO 1922	8	10	15	15	20	20	20	%	msmv
Heat resistance, % retention of shear strength, +60°C ¹⁾	ASTM C393	>80	>80	>80	>80	>80	>80	>80	%	
Water resistance, % retention of shear strength	ASTM C393	>80	>80	>80	>80	>80	>80	>80	%	

¹⁾ Heat resistance temperature: +60°C

Legends:

msmv = Manufacturer's Specified Minimum Value

msv = Manufacturer's Specified Value (average values at average densities)

Application/Limitation

Core material for FRP sandwich constructions:

- manufacture of components for applications in marine vessels,
- manufacture of wind turbine generators (rotor blades, nacelle covers, spinners), ref. DNV-ST-0376.

Area of application will be evaluated during approval of classified objects.

The foam complies with the applicable requirements of DNV 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

Tests carried out

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

Marking of product

Product shall be marked with *manufacturer's name*: **Changzhou Tiansheng Composite Materials Co., Ltd., China** and *type designation*.

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 Type Approval Certificate.

Periodical assessment



Job ID: **262.1-007338-4**
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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 assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

END OF CERTIFICATE