Certificate no.:
TAK00002HS

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Sandwich Core Materials

with type designation(s)
HXcell-series: X60, HX60, HX80, HX100, HX130, HX200

issued to
Dongying Ruizhi Composite Co., Ltd.
Dongying, Shandong Province, **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 **2025-06-10**
This Certificate is valid until **2030-06-09**.
DNV local unit: **Qingdao NB & CMC**

for **DNV**

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 USD 300 000.

Product description

HXcell-series: X60, HX60, HX80, HX100, HX130 and HX200. A PVC rigid foam.

Approved variants

X60: 54 – 69 kg/m^3
HX60: 54 – 69 kg/m^3
HX80: 72 – 90 kg/m^3
HX100: 90 – 115 kg/m^3
HX130: 120 – 150 kg/m^3
HX200: 180 – 230 kg/m^3

Note: X60 and HX60 have different cell dimensions.

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

Properties	Test Method	X60	HX60	HX80		
Tensile Strength	ASTM C297	2.16	1.88	2.41	MPa	msv
Tensile Strength	ASTM C297	1.7	1.7	2.3	MPa	msmv
Tensile Modulus	ASTM C297	95.7	96.2	126	MPa	msv
Tensile Modulus	ASTM C297	75	87	118	MPa	msmv
Compressive Strength	ISO 844	1.17	1.03	1.51	MPa	msv
Compressive Strength	ISO 844	0.85	0.85	1.4	MPa	msmv
Compressive Modulus	ISO 844	92.2	90.8	119	MPa	msv
Compressive Modulus	ISO 844	70	75	115	MPa	msmv
Shear Strength	ISO 1922	0.853	0.763	1.09	MPa	msv
Shear Strength	ISO 1922	0.7	0.7	0.95	MPa	msmv
Shear Modulus	ISO 1922	24.8	23.1	31.5	MPa	msv
Shear Modulus	ISO 1922	18	20	28	MPa	msmv
Shear Strain	ISO 1922	21.5	17.1	22.5	%	msv
Density	ISO 845	60	60	80	kg/m^3	msv
Density	ISO 845	54	54	72	kg/m^3	msmv

Properties	Test Method	HX100	HX130	HX200		
Tensile Strength	ASTM C297	3.51	4.25	6.62	MPa	msv
Tensile Strength	ASTM C297	3.0	3.5	5.5	MPa	msmv
Tensile Modulus	ASTM C297	150	186	341	MPa	msv
Tensile Modulus	ASTM C297	130	160	270	MPa	msmv
Compressive Strength	ISO 844	2.29	3.05	5.64	MPa	msv
Compressive Strength	ISO 844	1.8	2.8	4.8	MPa	msmv
Compressive Modulus	ISO 844	161	206	353	MPa	msv
Compressive Modulus	ISO 844	140	170	300	MPa	msmv
Shear Strength	ISO 1922	1.57	2.13	3.13	MPa	msv
Shear Strength	ISO 1922	1.35	1.8	2.5	MPa	msmv
Shear Modulus	ISO 1922	41.6	53.6	83.1	MPa	msv
Shear Modulus	ISO 1922	35	48	75	MPa	msmv
Shear Strain	ISO 1922	20.3	24.0	20.8	%	msv
Density	ISO 845	100	130	200	kg/m^3	msv
Density	ISO 845	90	120	180	kg/m^3	msmv

Remarks:
Standards used for Type Testing are others than required in the Standards/Rules.

Legends:
msmv = Manufacturer's Specified Minimum Value
msv = Manufacturer's Specified Value (average values)

Application/Limitation

The approval covers the densities listed above.

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*: **Dongying Ruizhi Composite Co., Ltd., China**, *type designation*: **HXcell**, *density* and *date of production/batch number*.

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

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