



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. K-2212
This Certificate consists of 3 pages

This is to certify that the
Sandwich Core Materials

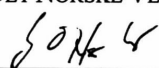
with type designation(s)
**ROHACELL 51 IG, ROHACELL 61 IG, ROHACELL 71 IG,
ROHACELL 110 IG and ROHACELL 200 IG**

Manufactured by
RÖHM GmbH & Co. KG Chemische Fabrik
Darmstadt, Germany

is found to comply with
Det Norske Veritas' Tentative Rules for Certification and Classification of Boats 1997, Grade 2
Det Norske Veritas' Rules for Certification of Life Boats 1998, Grade 2
Det Norske Veritas' Rules for Classification of High Speed and Light Craft

Application
Core material for use in sandwich construction. Area of application will be evaluated during approval of classified objects.

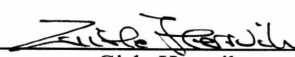
Place and date
Høvik, 2003-01-14
for DET NORSKE VERITAS AS


John Olav Nøkleby
Head of Section



Local Office
DNV Essen

This Certificate is valid until
2006-12-31


Gisle Hersvik
Surveyor

Notice: 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.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



Cert. No.: K-2212
File No.: 332.40

Product description

Polymethacrylimide, PMI, based core materials for sandwich constructions:

ROHACELL 51 IG, ROHACELL 61 IG, ROHACELL 71 IG, ROHACELL 110 IG and
ROHACELL 200 IG.

The following manufacturer's specified values are confirmed by Type Testing:

Properties	Test method	51 IG	61 IG	71 IG	110 IG	200 IG	Unit	
Tensile strength, Flatwise	ASTM C297	1,3	1,5	1,7	2,5	4,8	MPa	msmv
Tensile modulus, Flatwise	ASTM C297	55	61	68	110	250	MPa	msv
Tensile strength	ASTM D638	1,9	2,2	2,8	3,5	6,5	MPa	msmv
Tensile modulus	ASTM D638	70	81	92	160	340	MPa	msv
Compressive strength, 23°C	ISO 844	0,9	1,2	1,5	3,0	8,5	MPa	msmv
Compressive modulus, 23°C	ISO 844	63	73	84	145	320	MPa	msv
Shear strength	ASTM C273	0,8	1,05	1,3	2,4	4,8	MPa	msmv
Shear modulus	ASTM C273	19	24	29	50	145	MPa	msv
Shear elongation	ISO 1922	5	4,5	4,5	4,5	3,8	%	msmv
Density	ISO 845	52	64	75	110	205	kg/m ³	msmv

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

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

Documentation of additional material properties may be required at the approval of classified objects.

Type Approval documentation

1. Previous Type Approval Certificate no. K-1617.
2. Letter from DNV Essen of 2002-12-13, including Survey Report of 2002-11-13 and test results.

Tests carried out

Type Testing as per Type Approval documentation.

Marking of product

Product shall be marked with *manufacturer's name and type designation*.



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Certificate Retention/Renewal Survey

The scope of the Retention/Renewal Survey 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.

Survey to be performed after two (2) years (Certificate Retention Survey) and at renewal after four (4) years (Certificate Renewal Survey).

The main elements of the survey are:

- 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 the DNV Type Approval Certificate.

END OF CERTIFICATE

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