

## Product Info on ROHACELL® WF

ROHACELL® WF (Grade with increased heat distortion resistance) is a closed-cell rigid foam based on PMI (polymethacrylimide) chemistry, which does not contain any CFC's.

ROHACELL® WF (dry condition) can be processed up to temperature of 130°C (266°F) and maximum pressure up to 0,7 MPa (100 PSI).

ROHACELL® WF-HT (heat treated) can be processed up to temperature of 180°C (356°F) and maximum pressure up to 0,7 MPa (100 PSI).

ROHACELL® WF is utilized in manufacturing advanced composite components such as; aircraft / spacecraft structures.

Structural components can be manufactured by the following cure methods; autoclave, vacuum bagged, RTM, VARTM, press and others.

The thermoformability of ROHACELL® provides a tremendous manufacturing advantage. The thermo-elastic properties make this unique to ROHACELL®.

ROHACELL® WF is easy to shape and machine.

® = registered trademark

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# ROHACELL® WF



## Applications of ROHACELL® WF

conquers space



In sports and racing cars on the fast track



Pressure bulkhead A380



helicopters



Pressure bulkhead  
A340-600



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## ROHACELL® conquers space

ROHACELL® WF is the core of choice for Boeing Space launch vehicle programs Delta II, III, and IV. Delta IV uses ROHACELL® WF for payload fairing, centerbody, payload adapter, interstage, booster nose cones and heatshield.



ROHACELL® 110 WF and 200 WF are utilized in the payload fairing components

Delta IV heavy - first successful launch, 2005

The payload fairing of the Delta II rocket consists of two ROHACELL® half shells which are approximately 30 feet (9 meters) in length. The ROHACELL® half shells are co-cured with prepreg epoxy skins. Because of ROHACELL®'s excellent resistance to creep compression, Boeing is able to consolidate the laminates in the autoclave without losing part thickness while maintaining a smooth surface. The same manufacturing technique is used on the Delta III and IV fairing components.

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## ROHACELL® in sports and racing cars on the fast track

Italian automobile company "Modena Design" manufactures a high performance sport car, using ROHACELL® for the load-bearing car body structure the ZONDA. Modena Design chose ROHACELL® because of its strength to weight ratio.

Other noted attributes of ROHACELL® are increased noise dampening, improved thermal insulation, improved crash behaviour. A similar construction using ROHACELL® is currently used in almost any F1 car. ATR is using ROHACELL® for super cars such as Ferrari, Lamborghini and Porsche.



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## ROHACELL® Pressure bulkhead A 380

Pressure bulkhead A 380 using ROHACELL® filled stringers manufactured by ROHACELL® Shapes department.



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## ROHACELL® for helicopters

Already in 1971 ROHACELL® PMI foam received the first Aircraft specifications for the Eurocopter Ecureil EC120 helicopter. The continuous success story of the use of high performance PMI foams in numerous helicopter models started with applications in the fuselage and in the main rotor blades of this helicopter platform, which is still being build in significant quantities.



Cross-section of main rotor blade of the EH 101 with a ROHACELL® core

Today the manufacturing of high performance advanced helicopter rotor blades using ROHACELL® structural sandwich cores is state-of-the-art technology. By using the ROHACELL® - foam-cored design, service life of rotor blades was increased from approximately 400-500 flight hours for the initial metal blade, to more than 10.000 flight hours, respectively unlimited service life today. PMI foam cores have been successfully introduced in many major blade programs. The main blade of WESTLAND's EH101 helicopter is probably the most impressive example. The length of the blade is approximately 8,5 metres.

Eurocopter makes intensive use of PMI foam cores for their range of helicopters. Today approx. 1800 individual parts of the BK117, EC 120, EC 135, Tiger and NH90 are using high performance ROHACELL® foam cores. Recently ROHACELL® foam cores have also been chosen for manufacturing of rotor blades for Sikorsky and Bell helicopters.

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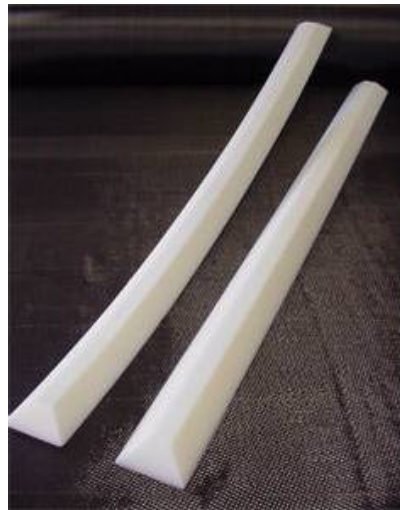
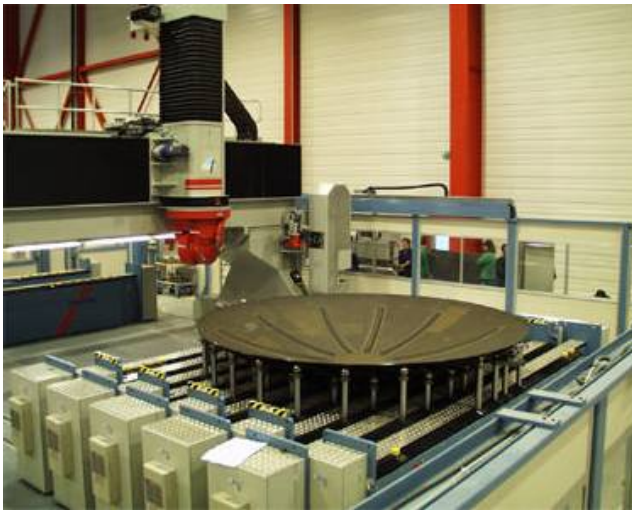
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# ROHACELL® WF



## ROHACELL® Pressure bulkhead A 340

Pressure bulkhead A 340 using ROHACELL® filled stringers manufactured by ROHACELL® Shapes department.



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## Properties of ROHACELL® WF

Properties	Unit	ROHACELL® 51 WF	ROHACELL® 71 WF	ROHACELL® 110 WF	ROHACELL® 200 WF	Standard
Density	kg/m <sup>3</sup>	52	75	110	205	ISO 845
	lbs./cu.ft.	3.25	4.68	6.87	12.81	ASTM D 1622
Compressive strength	MPa	0.8	1.7	3.6	9.0	ISO 844
	psi	116	246	522	1,305	ASTM D 1621
Tensile strength	MPa	1.6	2.2	3.7	6.8	ISO 527-2
	psi	232	319	536	986	ASTM D 638
Shear strength	MPa	0.8	1.3	2.4	5.0	DIN 53294
	psi	116	188	348	725	ASTM C 273
Elastic modulus	MPa	75	105	180	350	ISO 527-2
	psi	10,875	15,225	26,100	50,750	ASTM D 638
Shear modulus	MPa	24	42	70	150	DIN 53294
	psi	3,480	6,090	10,170	21,750	ASTM C 273
Elongation at break	%	3.0	3.0	3.0	3.5	ISO 527-2
						ASTM D 638
Heat distortion temperature	°C	205	205	205	205	DIN 53424
	°F	401	392	392	392	

Technical data of our products are typical values for the nominal density.

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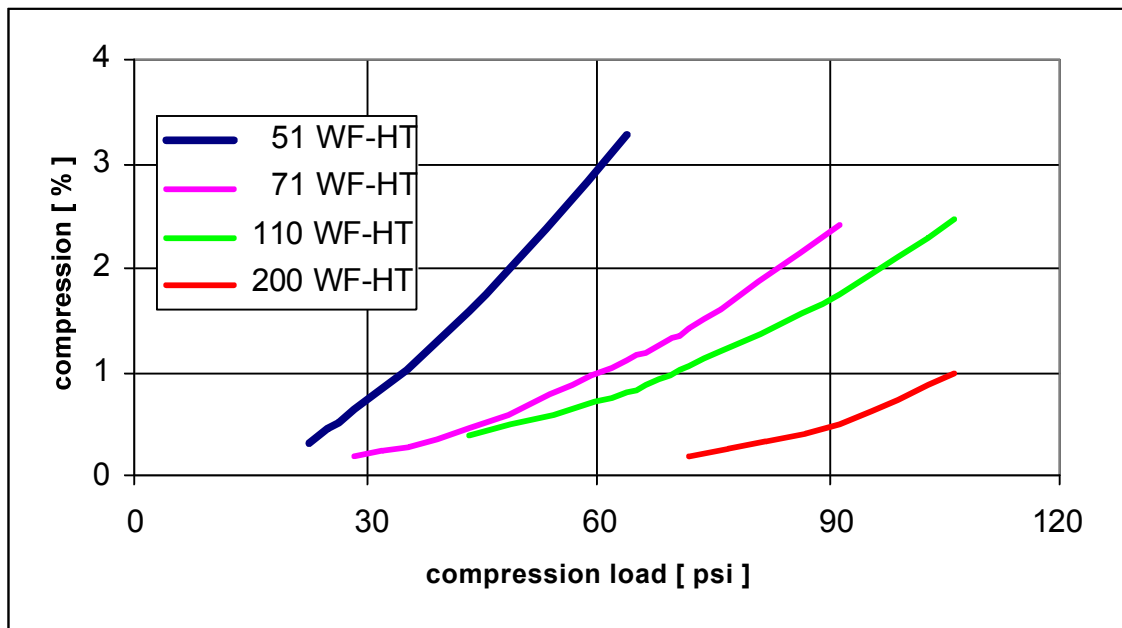
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## Compression creep ASTM D2990

Conditions: 356°F, 2h  
Specimen size: 50mm x 50mm x25mm



The data of this table / diagram are representative values, but not be used to establish specifications

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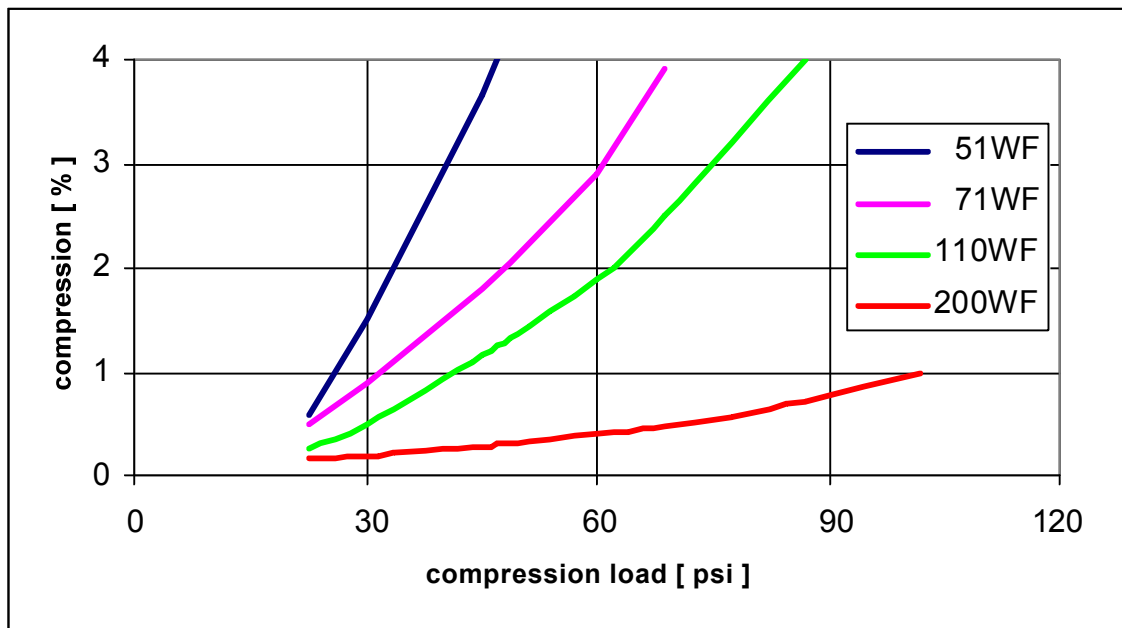
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## Compression creep ASTM D2990

Conditions: 266°F, 2h

Specimen size: 50mm x 50mm x25mm



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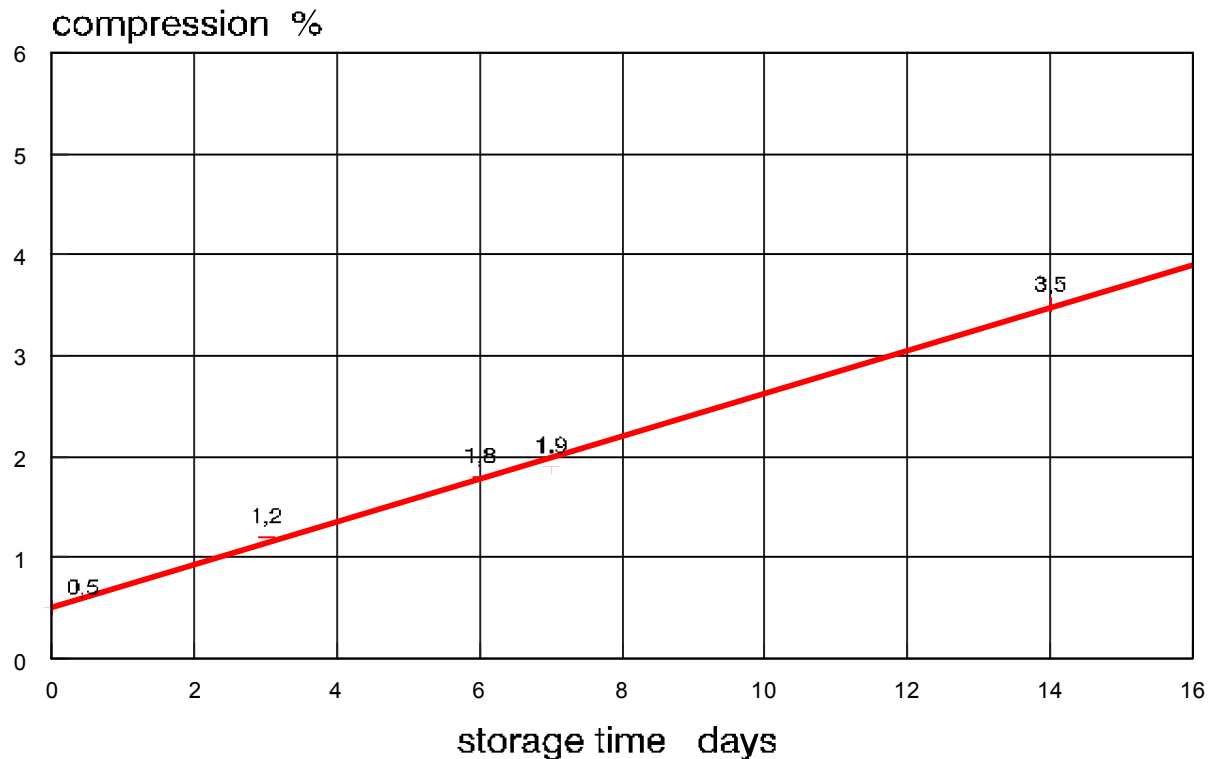
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## Out time behaviour of ROHACELL® 110 WF-HT

Storage condition: 23°C, 50% r.h.

Test conditions: 180°C, 0.7 MPa, 120 minutes

Specimen size: 50mm x 50mm x 25mm



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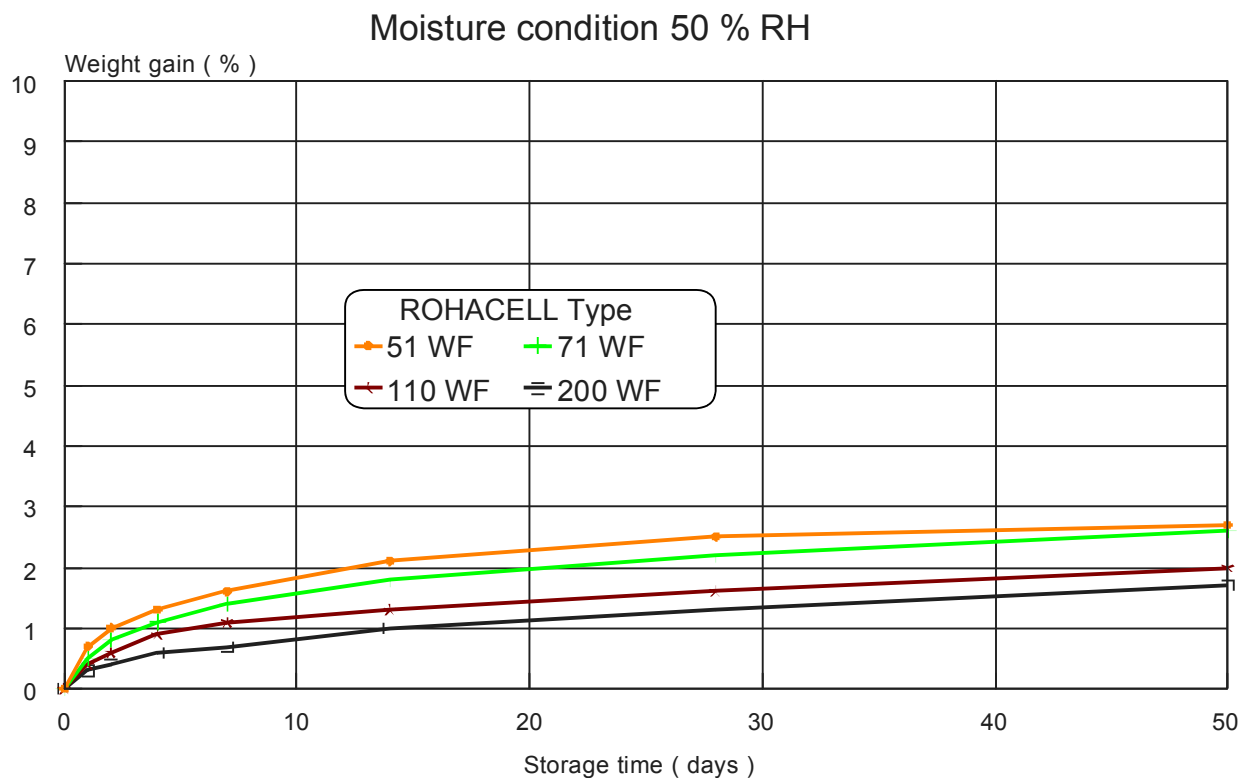
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## Moisture absorption

- Test temperature 23°C ( 73,4°F )



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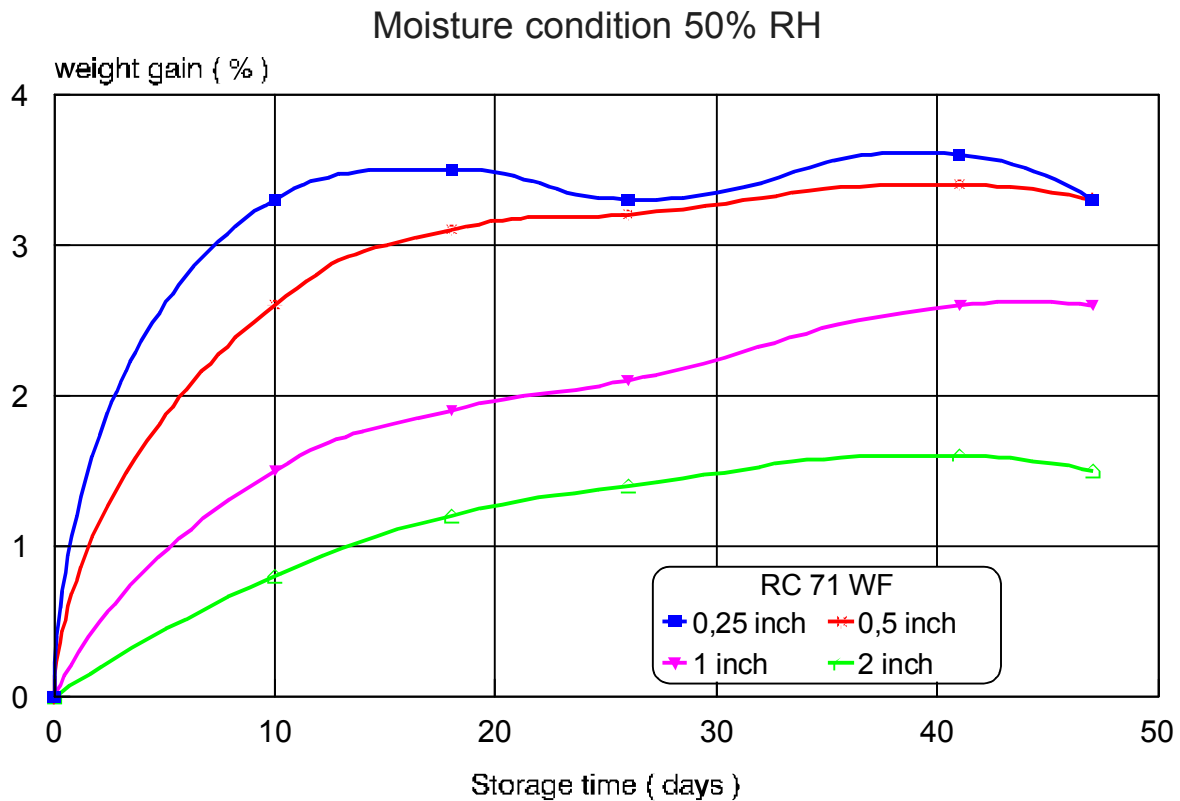
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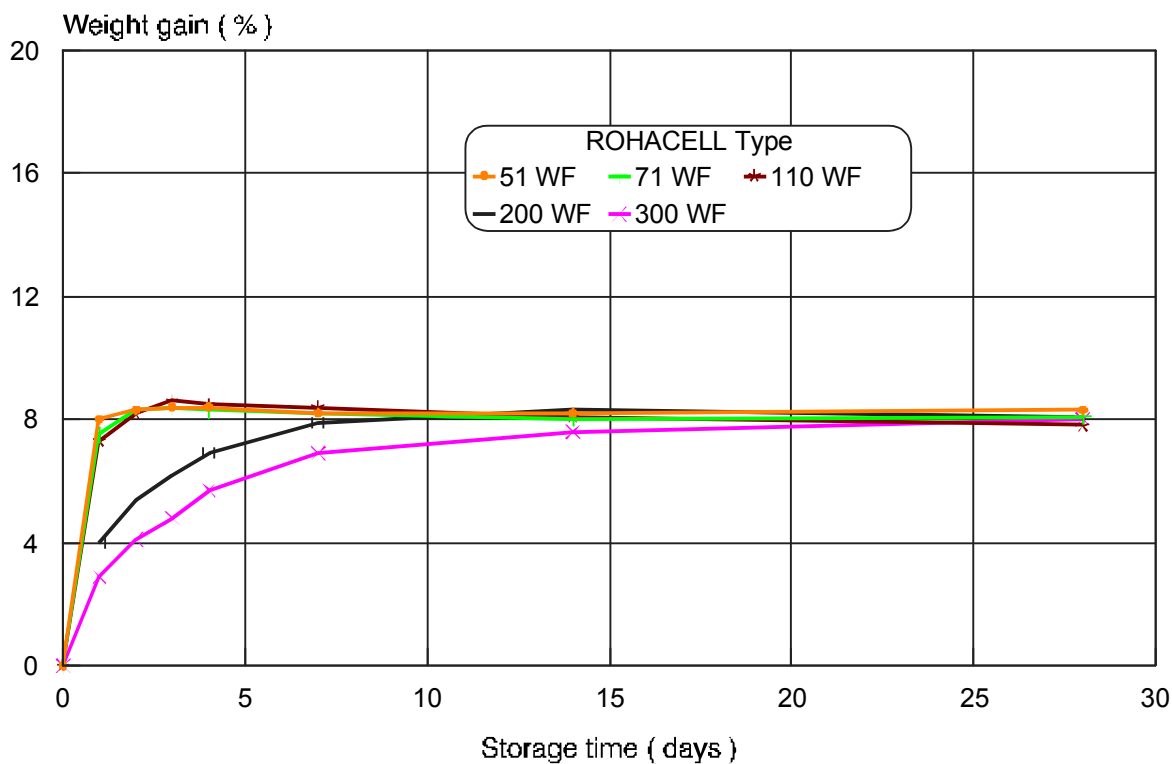
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## Moisture absorption

- Test temperature 70°C ( 158°F )

Moisture condition 85 % RH



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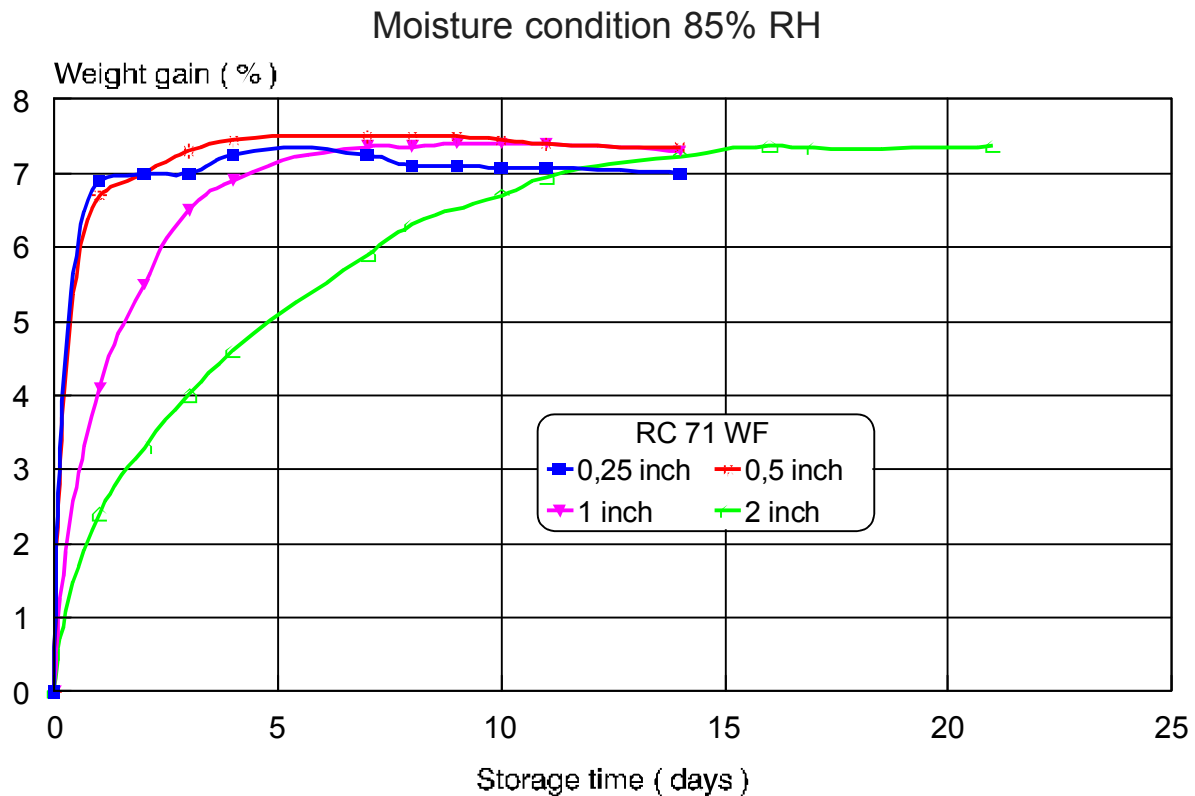
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## Moisture absorption

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## Sales Range

### January, 2008

ROHACELL®	Size [mm]	Standard sheet thickness [mm]	Possible sheet thickness [mm]
51 WF	2500 x 1250	4 to 80	1 to 120
71 WF	2500 x 1250	4 to 65	1 to 100
110 WF	2160 x 1100	4 to 55	1 to 90
200 WF	1900 x 900	6 to 32	6 to 55

Thickness tolerance +/- 0.2mm, others on request

ROHACELL®	Size [inch]	Standard sheet thickness [inch]	Possible sheet thickness [inch]
51 WF	98.4 x 49.3	0.16 to 3.14	0.04 to 4.72
71 WF	98.4 x 49.3	0.16 to 2.55	0.04 to 3.93
110 WF	85.0 x 43.3	0.16 to 2.16	0.16 to 3.54
200 WF	74.8 x 35.4	0.23 to 1.25	0.23 to 2.16

Thickness tolerance +/- 0.008inch, others on request

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This sales range represents the latest status as of January 2008. It is subject to alteration. With any new sales range the previous are invalid. Please ask for the latest update under the given address.

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## Sales Range

### January, 2008

ROHACELL®	Size [mm]	Standard sheet thickness [mm]	Possible sheet thickness [mm]
51 WF- HT	2500 x 1250	4 to 70	1 to 110
71 WF-HT	2500 x 1250	4 to 60	1 to 100
110 WF-HT	2160 x 1100	4 to 50	1 to 90
200 WF-HT	1900 x 900	12.7 to 25.4	12.7 to 50

Thickness tolerance +/- 0.2mm, others on request

ROHACELL®	Size [inch]	Standard sheet thickness [inch]	Possible sheet thickness [inch]
51 WF-HT	98.4 x 49.3	0.16 to 3.14	0.16 to 4.33
71 WF-HT	98.4 x 49.3	0.16 to 2.55	0.16 to 3.93
110 WF-HT	85.0 x 43.3	0.16 to 2.16	0.16 to 3.54
200 WF-HT	74.8 x 35.4	0.23 to 1.25	0.5 to 1.96

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