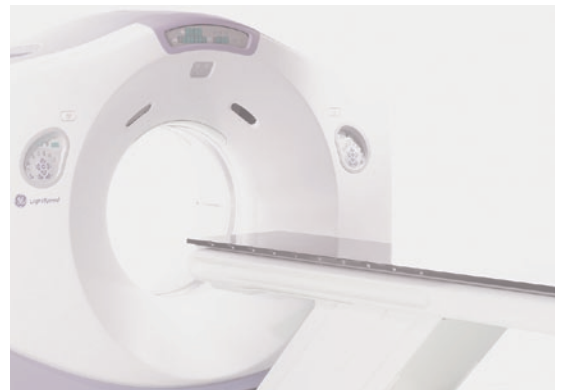
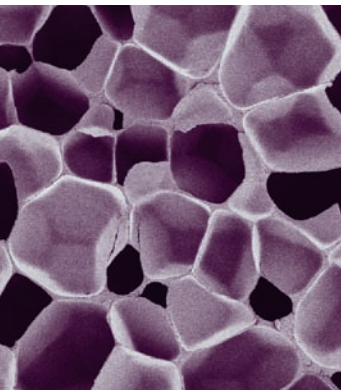


ROHACELL® for Medical Applications

Your best choice for structural sandwich foam cores



ROHACELL® – The Core Material for Composite Medical Applications



ROHACELL® has the highest strength to weight ratio as compared to any other structural foam core. It's special properties include:

- Very low radiation absorption
- Outstanding strength and stiffness at low densities
- Lighter weight table and couch tops allow for easier handling
- Thermoformable to cylindrical as well as complex curvatures to save on material, machining and labor costs
- Ease of machining with conventional wood-working tools, machines and techniques
- Compatible with all conventional resin systems and fabrication methods
- Free from halogens and CFCs
- High resistance to aging and high fatigue strength

ROHACELL®, based on PMI (polymethacrylimide) chemistry, has a fine, homogeneous and isotropic, 100% closed-cell structure.

The cell walls are of constant thickness and show no material concentration at the nodes. ROHACELL® foam cores therefore offer superior stability.

Owing to its unsurpassed property profile, ROHACELL® has for decades been the leading structural foam for advanced composite applications. It's typically used in the aerospace industry, also for manufacturing wind turbine rotor blades in addition to automotive and rail vehicle construction, as well as shipbuilding.

ROHACELL® has also been successfully employed for many years in a number of medical device components.

These include:

- X-Ray Couch Tops / Table Tops
- CT Couch Tops / Table Tops
- Operating Tables
- Mammography Plates
- Table Tops and Fixation Devices for X-Ray Therapy

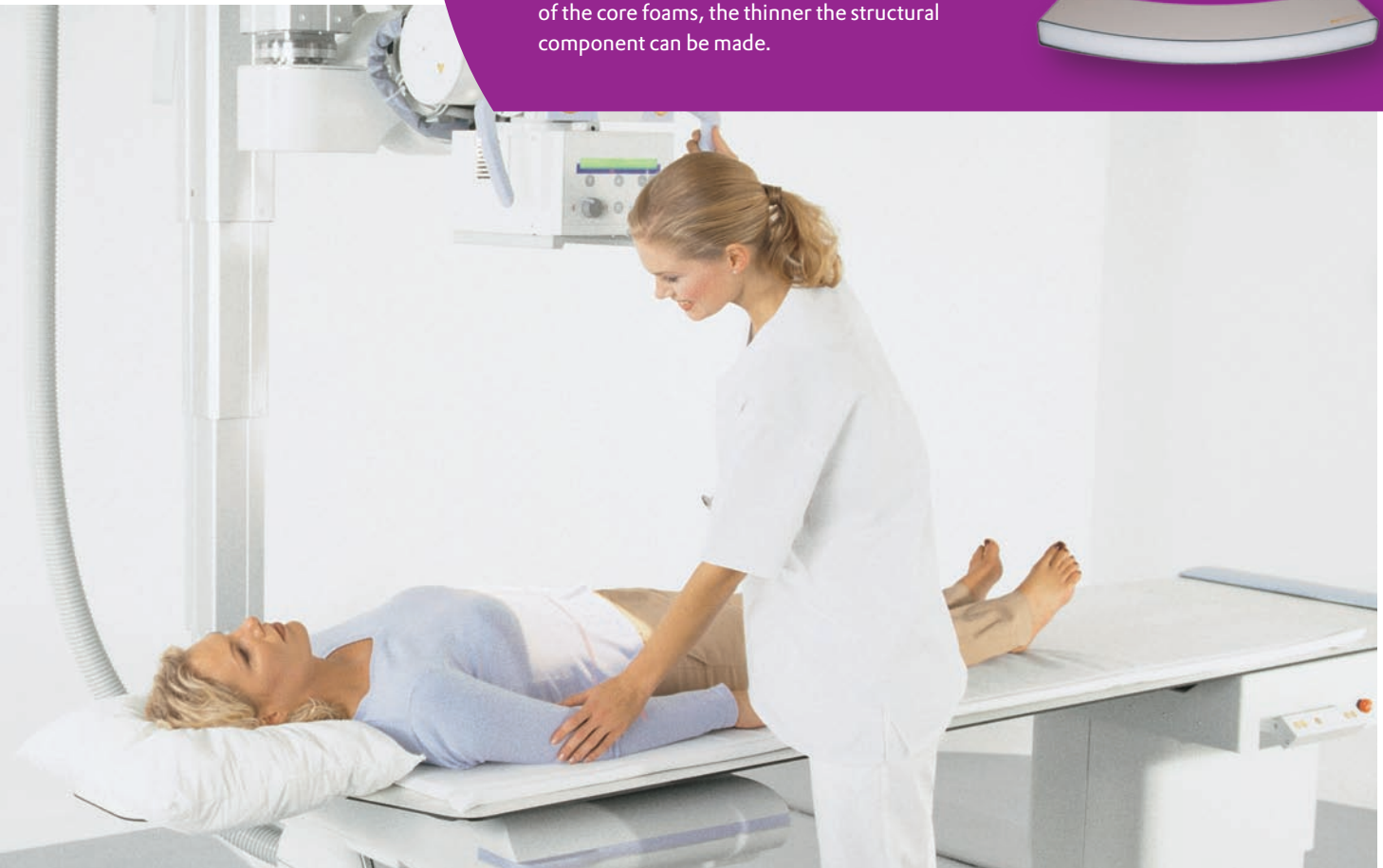


ROHACELL® – Thinner, More Lightweight Tables Offer Handling Benefits

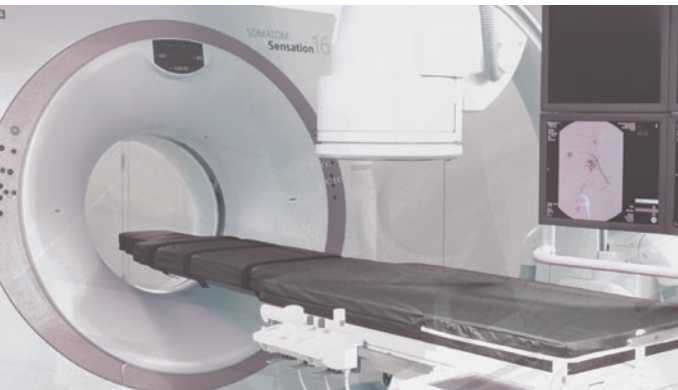


In structural composites applications such as CT tables, ROHACELL® is used as the core material between cover skins of carbon-fiber-reinforced plastics. The core material gives shape to the cover skins until their resins have completely cured. Later, when the table tops are in service, the core material transmits forces from one cover skin to the other. The greater the load transmission of the core foams, the thinner the structural component can be made.

Among polymeric rigid foams, ROHACELL® is the core material with the highest strength and stiffness at minimum weight. That means couch and table tops made with ROHACELL® are not only much thinner than ones made with other core materials, they are also much lighter in weight and therefore much easier to handle in everyday use.



Statements on Potential X-Ray Risks



"Ionizing radiation is among the risk factors related to cancer and leukemia ... Even low doses increase the probability of cancer or leukemia in persons exposed to radiation ..."

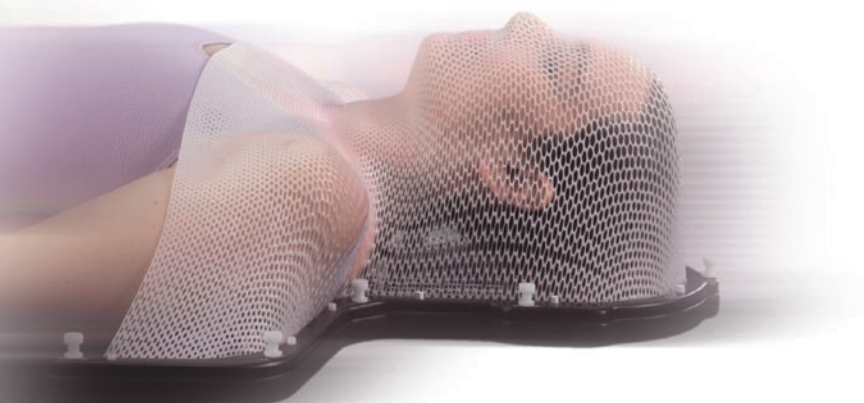
German Federal Office for Radiation Protection, Apr. 11, 2003
www.bfs.de/ion/wirkungen/leukemie.html

"Since no radiation level is considered small enough to be harmless, the requirement of ALARA (as low as reasonably achievable) naturally arises and is applied to ever-lower doses."

American Nuclear Society, June 2001
Health Effects of Low-Level Radiation, Position Statement

"Whoever plans, conducts or gives instructions to conduct an activity under this ordinance is obliged to keep the exposure to radiation of humans and the environment as low as scientifically and technically achievable (= ALASTA principle)."

German X-Ray Ordinance §2c (2), April 30, 2003



ROHACELL® – Reduction in Radiation Level and Lower Scatter Radiation – Greater Safety for Patients

Much thinner and lighter table tops can be achieved when manufactured with ROHACELL® core, as opposed to other core materials, due to the higher weight-specific strength and stiffness. Their reduced mass means ROHACELL® cored table tops absorb lower radiation levels than tables with other core materials. The radiation required for radiology can therefore be minimized, so the

patient is exposed to lower levels and the health risk is reduced accordingly. In addition, thinner table tops reduce scatter radiation and provide X-Ray images of much higher quality.

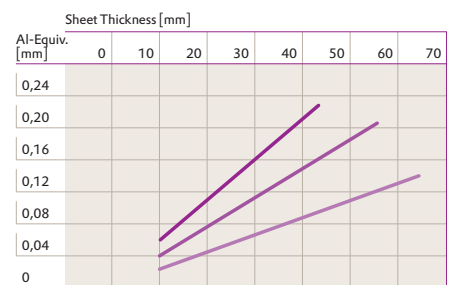
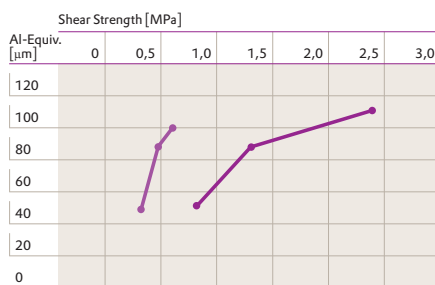
For these reasons, the world's leading manufacturers of high-quality X-Ray and CT table tops have for decades placed their trust in ROHACELL®.



Left:
Aluminium Equivalent of ROHACELL® and PUR, Thickness 10 mm, in Relation to Shear Strength

Values – Aluminium Equivalent:
Measured by PTP, Braunschweig, Germany
Shear Strength: Taken from Catalogues

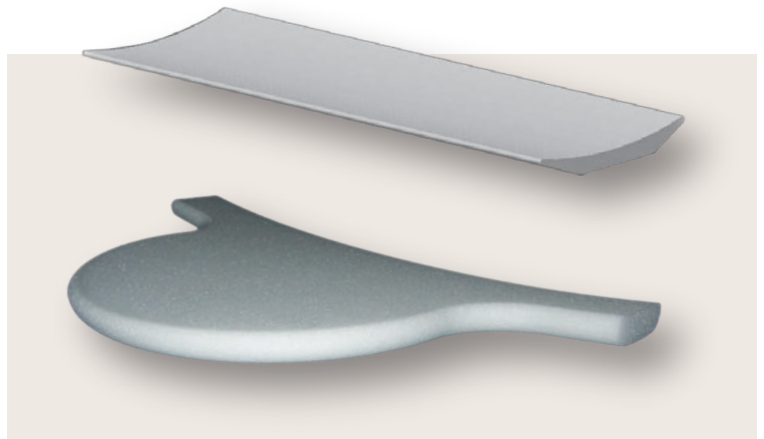
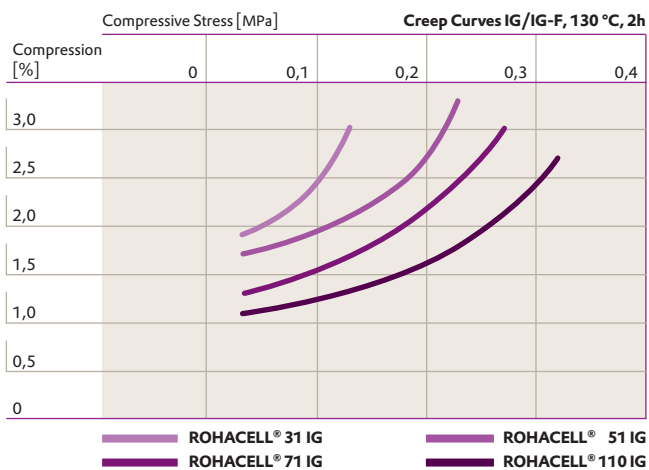
Right:
Aluminium Equivalent of ROHACELL®



ROHACELL® IG
PUR

ROHACELL® 71 IG
ROHACELL® 51 IG
ROHACELL® 31 IG

Ease of Manufacturing – ROHACELL® – The Ideal Sandwich Core



Components of X-Ray diagnostic and therapy equipment, such as X-Ray and CT table tops, are increasingly being built and manufactured with novel and sometimes complex geometries. Rising requirements for geometrical freedom can be easily met using sandwich construction techniques.

Thermoforming

ROHACELL® can be precisely thermoformed with simple tools. In many cases, this saves considerable machining costs and minimizes costly material losses. For further details on the subject of thermoforming, contact your local ROHACELL® partner or our Engineering Service.

Machining

ROHACELL® can be quickly and inexpensively sawed, drilled, turned or routed with all conventional machines and tools similar to those used for wood-working.

Bonding

ROHACELL® can be bonded to itself or other materials with almost any commercially available adhesive system, including adhesive films. Alkaline based adhesives shall however not be used.

Ease of Fabrication of ROHACELL®

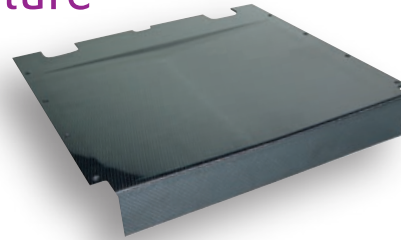
Owing to its excellent creep compression resistance (dimensional change under the influence of pressure and temperature), ROHACELL® is ideally suited for autoclaving and compression molding, as well as for resin injection methods. ROHACELL® can be processed without problems at temperatures up to 130 °C (266 °F) and, depending on density, at pressures up to 0.35 MPa (50 psi). Special grades can be processed to well above 200 °C (400 °F) and at pressures up to 0.7 MPa (100 psi). ROHACELL® is also compatible with all thermoset and thermoplastic matrix systems.

Moisture Management

The 100 % closed-cell foam structure of ROHACELL® makes it impossible for water to penetrate directly. However, depending on the ambient temperature and humidity, diffusion of water molecules may occur. An excessive moisture uptake in ROHACELL® would reduce the creep compression resistance during sandwich manufacturing. If the manufacturing of the sandwich component is done in the autoclave, or by means of press molding or RTM, it is advisable to dry ROHACELL® in an air circulating oven prior to sandwich manufacturing. Detailed information on drying is available on our comprehensive data CD.

Moisture absorption is not a concern in the finished component provided with cover skins.

Fine of Coarse – ROHACELL® with a Customized Cellular Structure



For medical devices, we recommend ROHACELL® IG and IG-F grades. Both materials are ideally suited for these applications and have identical physical properties. The difference between these grades is that IG-F has a finer cell structure. Cell size is a relevant parameter for sandwich manufacturing. It determines the so-called initial compression of the foam core. Larger cells undergo greater

initial compression than smaller ones. This should be taken into account when selecting the ROHACELL® grade, and also when manufacturing the structural component, so as to obtain the specified dimensions of the finished component. There are no hard-and-fast rules for choosing between ROHACELL® IG and IG-F: both grades are, in principle, equally well suited.

Data Sheet: ROHACELL® IG · IG-F · HF

Properties	Unit	ROHACELL® 31 IG · IG-F · HF	ROHACELL® 51 IG · IG-F · HF	ROHACELL® 71 IG · IG-F · HF	ROHACELL® 110 IG · IG-F	Standard
Density	kg / m ³	32	52	75	110	ISO 845
	lbs / ft ³	2.0	3.25	4.68	6.87	ASTM D 1622
Compressive strength	MPa	0.4	0.9	1.5	3.0	ISO 844
	psi	58	130	217	435	ASTM D 1621
Tensile strength	MPa	1.0	1.9	2.8	3.5	ISO 527-2
	psi	145	275	406	507	ASTM D 638
Shear strength	MPa	0.4	0.8	1.3	2.4	DIN 53 294
	psi	58	116	188	348	ASTM C 273
Elastic modulus	MPa	36	70	92	160	ISO 527-2
	psi	5,220	10,150	13,340	23,200	ASTM D 638
Shear modulus	MPa	13	19	29	50	DIN 53 294
	psi	1,885	2,755	4,205	7,250	ASTM C 273
Strain at break	%	3.5	4.0	4.5	4.5	ISO 527-2 ASTM D 638
Heat distortion temperature	°C	180	180	180	180	DIN 53 424
	°F	356	356	356	356	

ROHACELL® HF grade has an extremely fine cell structure and has established itself as the ideal material for manufacturing mammography plates.

ROHACELL® is available in sheet format with the following length and width:

ROHACELL® 31, 51 & 71 IG / IG-F / HF
2500 x 1250mm
and
ROHACELL® 110 IG / IG-F
2160 x 1100mm

Your local ROHACELL® partner or our Engineering Service will be pleased to answer any questions concerning sheet thicknesses, tolerances or special sizes.

ROHACELL is a registered trademark of Evonik Röh m GmbH, Darmstadt, Germany.

® = registered trademark

Certified to DIN EN ISO 9001 (Quality)
and DIN EN ISO 14001 (Environment).

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Evonik. Power to create.