

Processing & Handling Information

Working with ROHACELL®

ROHACELL® is one of the most innovative and reliable foam core products available on the market today. Known for its unique combination of benefits that include design freedom, low density and ease of processing, you can ensure your product experience is a success by following these helpful tips and guidelines.

Your ROHACELL® representative is an excellent resource at the beginning of your project and can assist you in selecting the optimal product for your application and informing you of any special handling and processing requirements.

Important factors to consider:

- **Delivered Product Options**
- **Storage**
- **Drying & Moisture Management**
- **Heat Treatment (HT)**
- **Machining**
- **Thermoforming**
- **Bonding**
- **Processing**

DELIVERED PRODUCT OPTIONS

ROHACELL® sheets and shapes can be delivered in three different conditions. Depending on the condition you select, different handling is required following receipt and storage by you.

- **Standard Foam** – delivered covered with thermoplastic foil (The foil covering only prevents the surface from becoming dirty and does not protect against moisture.)
- **Pre-Dried Foam** – delivered sealed in an aluminum bag (Protects against moisture and other surface contaminants.)
- **Heat-Treated (HT) Foam** – delivered sealed in an aluminum bag (Protects against moisture and other surface contaminants.)

STORAGE

In general, ROHACELL® sheets and shapes should always remain dry during storage.

All products shipped in an aluminum moisture protection bag should remain stored in the unopened bag until immediately before processing. Opened bags can be resealed by welding. For short-term storage (in a clean room environment for approximately 8 hours), closing the bag with adhesive aluminum tape may be sufficient. Moisture-proof aluminum bags used by Evonik are warranted to keep foam dry for 1 year.

For standard products delivered with protective thermoplastic foil covering, we recommend leaving the protective layer intact during storage and only removing it immediately prior to processing. This will help prevent accumulation of dirt or other contaminants that could be present in the storage environment.

When stored in the original packaging and at room temperature in a moisture-free environment, unprocessed material that is kept dry, clean and protected from UV light has a shelf life of 5 years from the date of shipment.

For material storage, a proper moisture management system is very important. Our technical service team and your ROHACELL® representative can work with you to establish an efficient moisture management plan. This includes determining the moisture limit and specific “out-time” (period of unprotected product exposure to the environment prior to processing) for your application’s production process.

DRYING & MOISTURE MANAGEMENT

Similar to other organic materials, ROHACELL® absorbs moisture from the environment. Even though it is a closed cell foam, a small amount of moisture absorption occurs through diffusion that is heavily dependent on ambient temperature and atmospheric humidity. Drying prior to processing will improve the creep resistance behavior.

Drying is especially important when processing temperatures will be above 100 °C (212 °F), depending on the process pressure.

Any moisture uptake can cause small dimensional changes to occur that may adversely affect creep behavior. This is because water molecules that attach to the foam cells will act as plasticizers, making ROHACELL® more ductile. Additionally, steam can form during processing if temperatures exceed 100 °C (212 °F) – potentially affecting bonding of the skin to the foam core.

A good practice to include in a moisture management plan is to prepare a duplicate reference sample as a guide for the actual ROHACELL® core part. Prior to processing actual core parts, the reference sample can be re-dried and then measured to determine weight loss and current moisture level.

Moisture uptake by ROHACELL® is an easily reversible process. Both “Standard” and “Pre-Dried” sheets can be dried again if they are exposed to moisture. Re-drying the material restores original mechanical properties and, within certain limits, reverses dimensional changes.

(NOTE: ROHACELL® HERO cannot be re-dried. Please refer to “Special instructions for ROHACELL® HERO”.)

DRYING GUIDELINES FOR ROHACELL® SHEETS

THICKNESS	RECOMMENDED DRYING TEMPERATURE	APPROXIMATE DRYING TIME
<25 mm / <1 in	130 °C ± 5 °C (266 °F ± 9 °F)	4 hours
25–50 mm / 1–2 in		6 hours
50–75 mm / 2–3 in		8 hours
75–100 mm / 3–4 in		10 hours
>100 mm / > 4 in		12 hours

- Sheets can be dried in an air circulating oven, between heating plates, or using infrared heaters if sheet thickness is less than 6 mm (1/4”).
- During the drying process in an air circulating oven, each panel must be separated from each adjacent panel by no less than 25 mm (1 inch) to allow constant airflow.
- All precautions regarding panel placement and accurate temperature control must be strictly followed.
- Drying time depends on the sheet thickness

Special instructions for ROHACELL® HERO

Re-drying ROHACELL® HERO sheets or shapes is not possible. If unexpected exposure to moisture occurs, do not attempt to re-dry the product and immediately contact your ROHACELL® representative for assistance and further instructions.

HEAT TREATMENT (HT)

If you will be using autoclave processing with temperatures up to 190 °C (374 °F) and pressure up to 0.7 MPa (100 psi), a heat treatment process (HT) prior to processing ROHACELL® is required. Heat treatment can cause surface deterioration and a change in sheet volume, so final shaping of a core must be performed after heat treatment and not before.

Heat-treated ROHACELL® sheets should be processed within a specified period of time (out-time) depending on the storage environment, sheet thickness, manufacturing parameters and product density. Please consult with your ROHACELL® representative for your ROHACELL® product’s recommended “out-time”.

If the established out-time is exceeded, heat treatment can be repeated for un-shaped cores. Net-shaped cores **cannot** be heat treated again since re-heating will change the dimensions and the surface quality. Drying is especially important when processing temperatures will be above 100 °C (212 °F), depending on the process pressure.

MACHINING

ROHACELL® can be machined without lubricants on fast running wood or plastic processing machines, using typical tools for this purpose.

Common processing methods include drilling, planing, milling, sawing and sanding. Using CNC milling, complex 3D molded bodies can be shaped on CNC wood or plastic processing machines.

We can also do the shaping for you. In our Shapes Department, we produce fully processed and ready-to-use ROHACELL® cores on 4- and 5-axis CNC mills, according to your requirements. We provide quality support, from prototype to mass production (EN/AS 9100, ISO 9001).

THERMOFORMING

Creating ROHACELL® custom core shapes for sandwich construction is quick and easy with thermoforming.

All grades can be thermoformed, but specific temperature requirements vary and depend upon the product grade, density, process, final part geometry and the type of thermoforming equipment used.

Consultation with an expert in our Application Technology Center is highly recommended prior to thermoforming ROHACELL®.

In preparation for thermoforming, sheets must be dried (refer to the previous section titled "Drying & Moisture Management"). Parts can then be formed using a vacuum or non-vacuum diaphragm with a female / male mold or matched mold. Wood, polyester or epoxy resin molds are acceptable.

After drying and prior to thermoforming, the sheet should be heated in an oven, between heating plates or with infrared heaters. When the sheet reaches the correct thermoforming temperature for the specific grade and density (please consult with your ROHACELL® representative), it should be quickly transferred to the forming device. To easily transfer the sheet with minimal resistance, generous margins beyond the finished part shape are recommended.

During this transfer from the heating cabinet or heating plates to the forming device, cooling of the sheet must be kept at a minimum. To minimize the rapid cooling effect, a protective cover on the heated foam sheet during the transfer is required. Cotton cloth, breather, glass fabric or silicone rubber can be used as a protective cover.

Alternatively, the foam can be heated with at the same time by placing both together in an oven.

After transferring a sheet to the forming device, the mold is closed or vacuum is applied to the diaphragm to draw the foam into a final geometry.

Upon completion of part formation, the mold and foam are allowed to cool down together by removing them from the heat source. When the formed part has cooled to a temperature of 80 °C (176 °F), it can be removed from the mold. Uniform cooling from both sides prior to removal is recommended to avoid spring back.

BONDING

One of the biggest advantages of ROHACELL® is that it enables use of a co-curing process where facings are cured and bonded to the core material in a single work step. Its homogenous cell structure provides zero print-through to composite face sheets.

ROHACELL® is compatible with almost all commercially available adhesive systems and is resistant to solvents. It does not require any stabilizing agents, potting materials or additional stabilization cure cycles to provide lateral strength as this is an inherent property.

The closed-cell structure of ROHACELL® assures that resin fills only into the cut cells at the surface of the foam. This ensures adequate bonding to facings, and at the same time eliminates unnecessary weight and costs that permeated resin can add. You can choose from a variety of special grades that differ in cell size and resulting resin uptake to match the needs of your application and manufacturing process.

NOTE: Prior to bonding, all surface dust or dirt should be removed using oil-free compressed air. All foam cores should be handled with clean gloves to prevent the surface from exposure to fat/oil environmental contaminants.

PROCESSING

ROHACELL® sandwich construction provides extremely robust and durable composite materials compatible with all common thermoset and thermoplastic polymers. The high glass transition temperature (T_g) of the foam and its exceptional creep compression strength allow good consolidation of the fiber-polymer composite face sheets during processing, as well as very short production cycle times.

The high-performance foam can be processed at temperatures up to 190 °C (374 °F) and pressures up to 0.7 MPa (102 psi) over several hours. Temperatures of up to 210 °C (428 °F) are possible in a pressure-free post-cure process, also.

ROHACELL® is compatible with all common composite processing methods, including:

- Resin infusion (RTM, VARTM, VAP, MVI, SLI)
- Prepreg autoclave or Quickstep® techniques
- Wet pressing
- Tape laying and fiber placement
- Closed molding technology
- Filament winding
- Pultrusion

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