Processing, Handling & Logistics 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 benefits that include design freedom, low density and ease of processing. To ensure your product experience is a success please follow 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 inform 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 film (The film only prevents the surfaces of the foam 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** – offers improved compression (thickness loss) resistance and is delivered sealed in an aluminum bag that provides protection from moisture and other surface contaminants.

STORAGE

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

All products shipped in an aluminum moisture protection bag should remain stored unopened until the products are ready to enter immediately into the intended processing operation. For short-term storage of opened bags in a clean room environment for <8 hours), closing the bag with aluminum tape may be sufficient. For storage times of opened bags exceeding 8 hours or when bags are opened outside a clean room environment, bags should be resealed using heat sealing equipment. MIL-PRF-131 moisture-proof aluminum bags used by Evonik are warrantied to keep foam dry for 2 years when sealed.

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

Minimum storage requirements: Stored in the original Evonik packaging, stored at ambient room temperature, dry, clean, in unprocessed condition and protected from exposure to UV light. When stored under these conditions, shelf life is 5 years from the date of shipment.

NOTE: An exception is noted for "Heat-treated (-HT)" versions of products from Evonik, such products have a shelf life of 2 years from date of shipment.

All products must be handled with care during transportation at all times. It is not possible to stack or load multiple pallets or packages on top of each other, since this could potentially damage or destroy the products. Instructions printed on stickers on pallets and packages must be adhered to at all times.

For material storage, a proper moisture management system is highly recommended. Our technical service team 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 is an option, to improve compression creep behavior.

Drying is a good first step especially when processing temperatures will be above 100 °C (212 °F), depending on the process pressure. If your material is already Heat-Treated (-HT) a dry cycle is not necessary.

Moisture uptake can cause small dimensional changes and 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, vapor pressure can be generated if temperatures exceed 100 °C (212 °F) – potentially weakening the skin-to-core bond.

A good practice to include in a moisture management plan is to prepare a "witness panel" 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 is an option for you, which can restore original mechanical properties and, within certain limits, reverse dimensional changes.

(NOTE: Please refer to "Special instructions for ROHACELL® HERO")

- 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 upon the sheet thickness
- Drying also depends upon oven behavior. Please make sure to adjust your individual process accordingly.

DRYING OPTION FOR ROHACELL® SHEETS (ORIENTATIONAL VALUES ONLY)

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
70-100 mm / 3-4 in		10 hours
>100 mm / > 4 in		12 hours

Special instructions for ROHACELL® HERO

ROHACELL® HERO is always delivered as a Heat-Treated product by Evonik. If you plan to re-dry, heat-treated sheets or shapes, please contact your local ROHACELL® representative to discuss the details.

HEAT-TREATMENT (HT)

The compressive-creep resistance behavior of ROHACELL® can be improved with heat-treatment prior to processing (sheet cutting, CNC milling, thermoforming, face sheet curing, etc.).

The specific heat-treatment process used will depend upon several variables as well as the application manufacturing process.

Your ROHACELL® representative is an excellent resource to assist you in determining optimal preparation and processing required for all ROHACELL® products.

MACHINING

ROHACELL® must 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 geometries can be shaped.

Remove all in-house shaping time and waste by letting Evonik do the shaping for you. In our Shapes facility, we produce fully processed and ready-to-use ROHACELL® cores on 4- and 5-axis CNC mills, according to your requirements. We provide the highest quality support to our customers, 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 a ROHACELL® expert is highly recommended prior to thermoforming ROHACELL®.

In preparation for thermoforming, non-heat-treated 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 recommended 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 sheet cooling effect, the sheet should be wrapped in an insulative material prior to heating. Examples of common insulative materials are as follows: cotton cloth, breather, glass fabric or silicone rubber.

After transferring a sheet to the forming device or mold, pressure or vacuum is applied 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. It may be necessary to add an insulation layer to the backside of your composite part during cooldown.

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 all known commercially available adhesive systems and is resistant to solvents. It does not require any stabilizing fillers, potting materials or additional stabilization cure cycles to provide lateral strength as this is an inherent property due to ROHACELL®’s isotropic behavior.

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 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 (Tg) 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.

It 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 free-standing post cure.

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

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

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