

# QUALITY **INSPIRES.**



Advanced thermoplastic composites

**X** Tepex®

**QUALITY WORKS.**

**LANXESS**  
Energizing Chemistry

# DEFINING LEADING SOLUTIONS IN THERMO-PLASTIC COMPOSITES

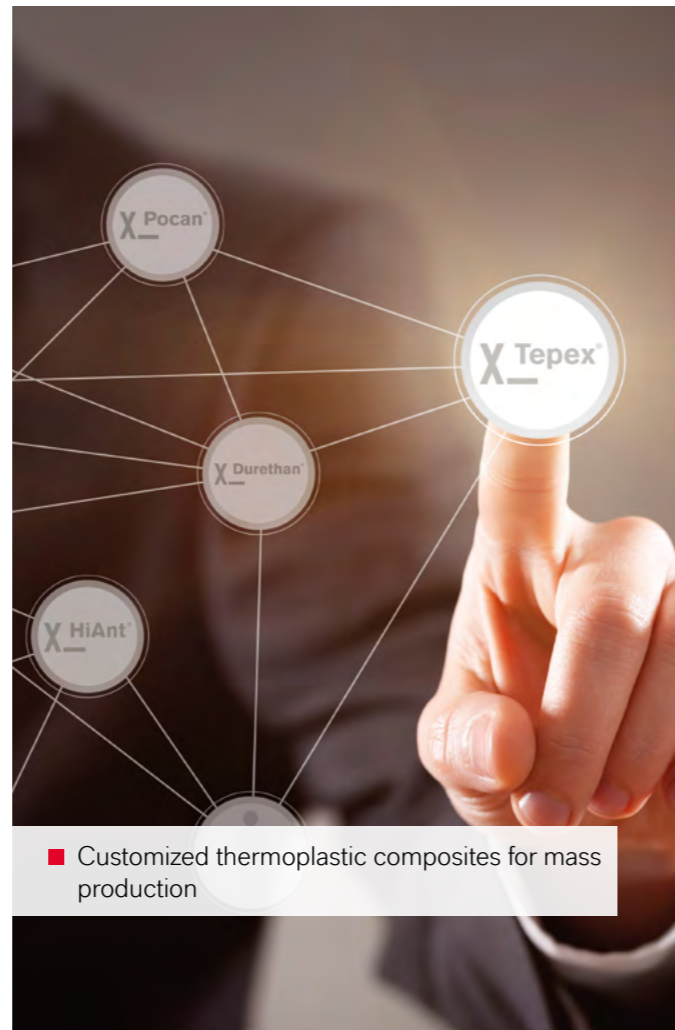


Tepex® - these are innovative, thermoplastic semi-finished products made of highly resilient composite materials, so-called organo sheets. They consist of continuous or long fibers in a matrix of various engineering thermoplastics. Fiber materials include glass, carbon, aramid and flax. This structure gives the flat semi-finished products their exceptionally high strength and rigidity combined with extremely low weight. In this way, even sophisticated components can be produced cost-effectively. In particular, the combination with plastic injection molding as a processing technique allows efficient series production. Versatile and high-performance at the same time, Tepex® is a convincing answer to challenges arising from current megatrends such as the New Mobility. It enables innovative solutions for individualized product designs and product properties as well as enhanced safety, resource conservation and environmental protection. Wherever large-scale lightweight construction and functional integration in a resilient, durable solution are required, Tepex® is the material of choice.

Our Tepex® team of experts has more than 25 years of experience in the development, production and processing of thermoplastic fiber composites. With Tepex® we have created an individually configurable system offering to optimally meet the specific requirements of our customers - from material and component design and testing to efficient series production. Tepex® has already proven itself in numerous market segments and in the production of a wide variety of components. Our development department is continuously expanding this product family and its range of properties in order to open up further areas of application with customized solutions.



The thermoplastic fiber composite Tepex® was developed back in the 1990s and has been produced by Bond-Laminates GmbH ever since. In 2012, the company then became a wholly owned subsidiary of LANXESS AG, a leading international specialty chemicals group. Its core business is the development, production and marketing of plastics, chemical intermediates and specialty chemicals. As part of LANXESS Performance Materials GmbH, to which Tepex® now belongs, we offer not only our Tepex® organic sheets with the high-performance plastics Durethan® and Pocan®, we also offer customized material combinations for customer-specific requirements.



# INDIVIDUAL CHARACTERISTICS

## 1. Stiffness & Strength

In wood, plants and bones, nature itself has demonstrated that high-strength fibers are the most suitable lightweight materials to transfer and absorb forces. The flexible fiber-orientation within the composite and its complete consolidation with a thermoplastic polymer enables solutions with high structural strength. Components can therefore be designed with very thin walls and thus be particularly light with **Tepex®**. We precisely adapt the properties of **Tepex®** to the requirements of our customers and their components. To this end, we develop tailor-made semi-finished products from different fiber materials and arrangements as well as various plastics - such as polyamides, polypropylene, polycarbonate, but also specialty plastics such as thermoplastic polyurethanes. The result is superior solutions for almost every application and industry.

## 2. Lightweight Design

**Tepex®** provides an exceptional weight-performance-ratio offering suitable solutions for all applications that require weight reduction without compromising structural performance.

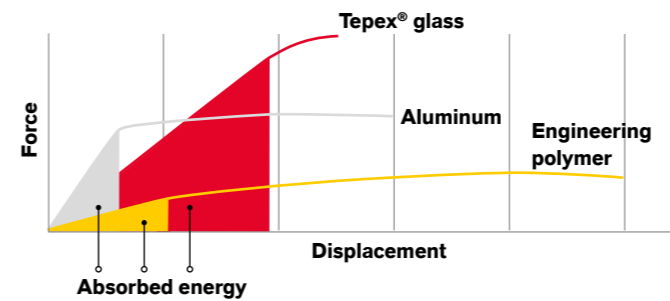
## 3. Sustainability

**Tepex®** lightweight materials are manufactured and processed in solvent-free processes and the thermoplastic matrix enables the realization of holistic recycling cycles. In this way, **Tepex®** contributes to a sustainable, climate-friendly and resource-efficient industry. In addition to the lightweight construction possibilities and the resulting lower carbon footprint that **Tepex®** opens up, the product portfolio of sustainable **Tepex®** combinations of recycled and bio-based raw materials such as flax is constantly being expanded.

## 4. Dynamics & Energy Absorption

Depending on material thickness and combination of fibers and thermoplastic polymers, **Tepex®** can provide material properties from high flexibility to high stiffness. Compared with other material classes these tailor-made properties of thermoplastic composites enable higher specific rates of energy absorption and make **Tepex®** a perfect solution for applications that require dynamic properties at reduced weight.

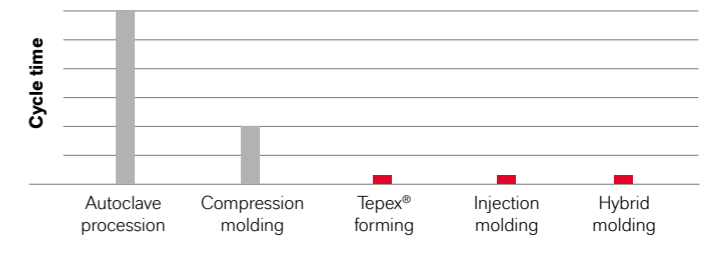
### Superior energy absorption



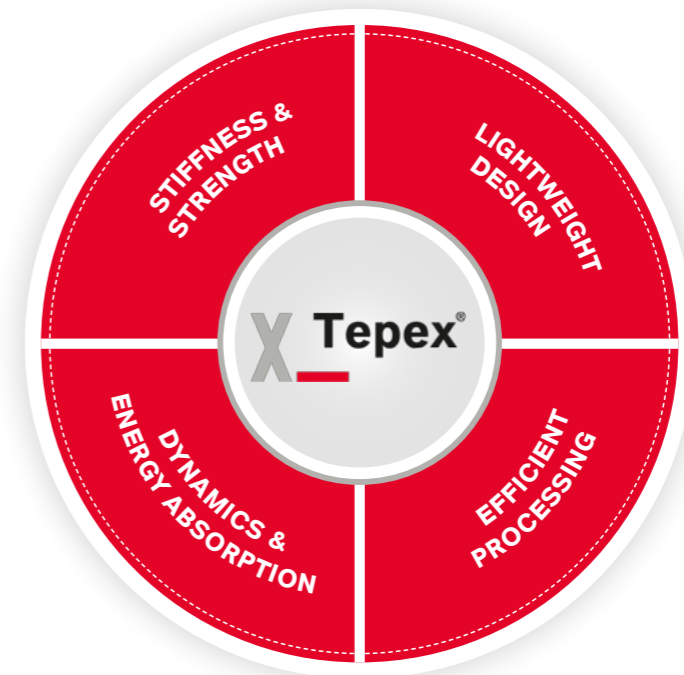
## 5. Efficient Processing

**Tepex®** materials are sold as semi-finished goods ready to be processed in thermoforming, hybrid molding or compression molding. **Tepex®** thermoplastic composites are designed for mass production manufacturing processes with low cycle times and constantly high quality. The processing of **Tepex®** can be combined with compression as well as injection molding so that complex parts can be manufactured in only one processing step. Besides a significant reduction of overall cycle time, major advantages of such hybrid molding processes are efficient use of material, elimination of product forming and trimming steps as well as increased freedom of part design.

### Higher processing speed – improved quality



### Cost-efficient due to individual material design



What is your material requirement?



# ENDLESS POSSIBILITIES – MARKET PROVEN APPLICATIONS

## Automotive

The automotive sector is facing increasingly strict requirements regarding fuel efficiency and weight reduction. This is particularly true for electromobility. All these requirements have to be met without compromising safety, performance and processing efficiency. **Tepex®** provides material solutions for structural and semi-structural parts that bridge such apparent contradictions of weight reduction, structural performance and maximum energy absorption. For example, **Tepex®** is already used in underbodies, brake pedals, battery enclosures and front ends. Low processing cycle-times of **Tepex®** material systems enable cost efficient parts and reliable mass-production processes in the automotive industry.

## Consumer Electronics

Besides weight reduction, functional integration and enhanced robustness modern electronic devices demand individual design and aesthetic attractiveness in terms of optical and haptic appearance. **Tepex®** thermoplastic composites with its superior strength-to-thickness ratio enable thin-wall structural applications for consumer electronics applications such as mobile phones and notebooks. These structural properties can be integrated in **Tepex®** materials with premium surface properties for visible as well as for coated surfaces. For consumer electronics **Tepex®** offers the highest flame retardant rating UL94 V-0 for a wide range of thicknesses and for fabric lay-ups.

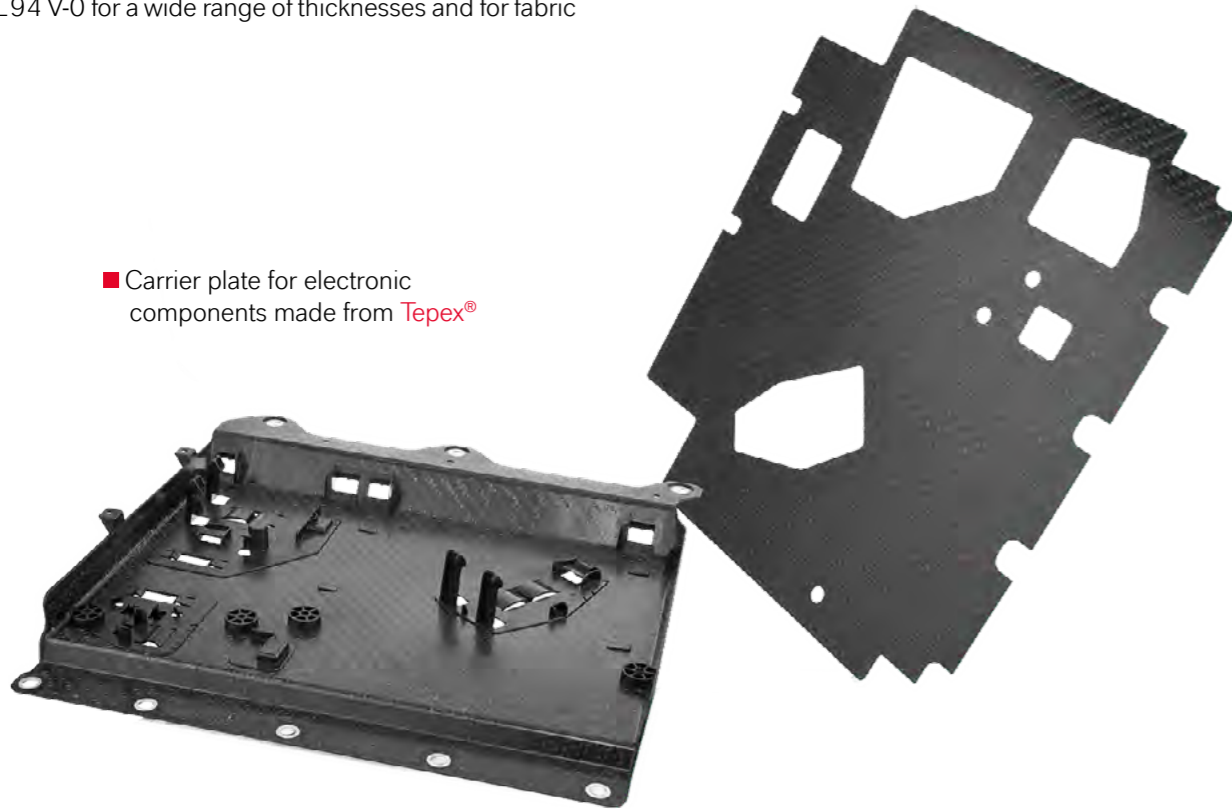
## Sports

As broad as the spectrum of sports equipment are the required material characteristics in applications like the sole of a sports shoe, bicycle components, ski boots or protective clothing and helmets. All these different performance requirements can be met by customized **Tepex®** material solutions. These combine reduced weight of parts and components with optimum performance such as energy return, impact resistance as well as premium aesthetics of visual parts and surfaces.

## General industry applications

Many industrial processes and applications rely on efficient use of energy. Moving parts made of **Tepex®** can significantly reduce their kinetic energy through weight reduction without compromising structural performance. Specific material properties like flame retardancy, resistance against elevated temperatures as well as the ability to absorb ballistic energy extend the field of applications for **Tepex®** in many industrial segments such as electrical and electronic equipment, in the public transport sector, protection sector or in the aerospace industry.

■ Carrier plate for electronic components made from **Tepex®**



# STANDARD MATERIALS FOR CUSTOMIZED SOLUTIONS

## Tepex® dynalite – Maximum strength at minimum weight

The Tepex® dynalite range consists of multiple layers of continuous fiber reinforcements in a matrix of engineering thermoplastics. The continuous fiber structure, fully consolidated with a thermoplastic polymer, provides the maximum possible strength and stiffness.

Tepex® dynalite is the optimum solution wherever high mechanical stability is required in lightweight construction - in organic sheet components for automobiles as well as for the soles of sports shoes.

## Tepex® flowcore – Cost effective flow molding

Similar to traditional sheet molding compound (SMC), Tepex® flowcore contains long glass fibers (30 - 50 mm), but with a thermoplastic polymer matrix. It can be used alone or in combination with Tepex® dynalite for design optimization. Formed into stiffeners and ribs, it increases the mechanical stability of components. Tepex® flowcore can be processed by conventional compression molding techniques. It can be used whenever injection molding materials do not meet the stability requirements and thermoset semi-finished products are out of the question.

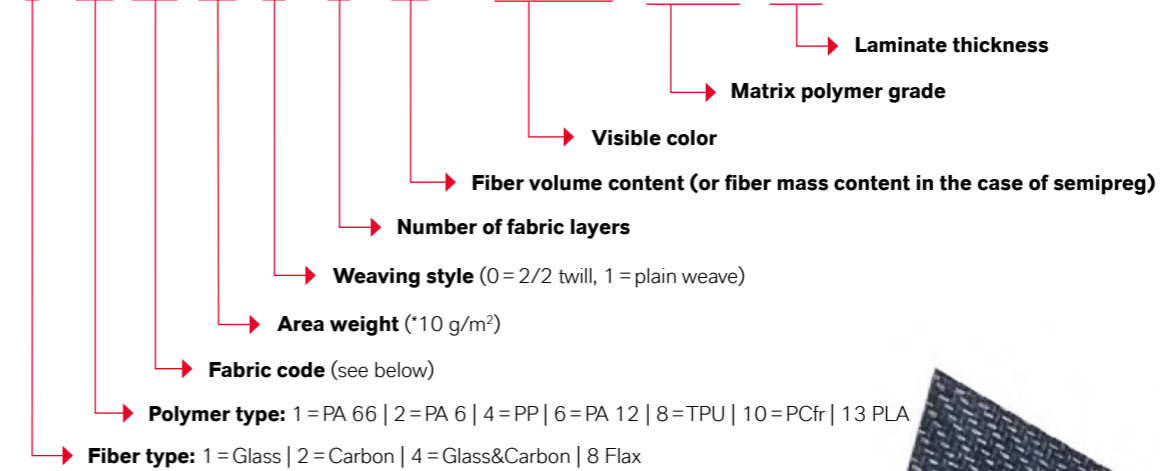
## Tepex® semipreg – Defined material thickness with lower density

In contrast to Tepex® dynalite, the materials of the semipreg family are not fully consolidated and thus mechanically less resilient. As a result, lower density and modified acoustic properties can be achieved with a defined material thickness. In applications for which the stiffness-dominated dynalite does not offer the suitable property profile, semipreg can be an economical alternative.

# NOMENCLATURE

## Tepex® dynalite | flowcore | semipreg

1 08-FG 29 0 (4)/45% - nature - Typ A - 1.0 mm



Fabric code:	FG	= Filamented Glass
	FGAL	= FG Alu coated silver/anthracite
	FGc	= FG colored
	RG	= Roving Glass
	RGUD	= RG Uni-Directional
	RGUDm	= RG multi-axial
	RGR	= RG Randomized fleece
	RGRch	= RG Randomized chopped
	C	= Carbon
	CUD	= Carbon Uni-Directional
	CNW	= Carbon Non-Woven
	F	= Flax
	A	= Aramid

Other Materials on request.



# INNOVATION FOR MATERIAL & PROCESSING

## Material Design

Tepex® is an innovative material system ready for customization to address application specific requirements and properties in a broad variety of applications and industries. In order to select the best-fit Tepex® material system and customize it for a specific application requirement, material and application development our experts closely cooperate with our customers – and of course ensure that customer specific intellectual property stays protected. Ideally, we work together with the customer at an early stage of product development. This enables our customers to tailor their component to all requirements in the best possible way as early as the design phase and to optimally integrate the use of the semi-finished products into their manufacturing process. Our goal is an optimal fiber-matrix combination and the highly automated and thus cost-efficient production and quality control of Tepex® components.

## Manufacturing

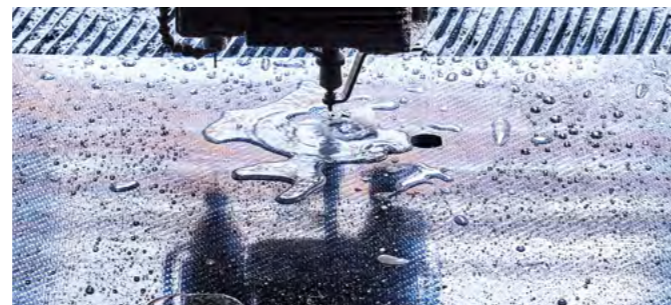
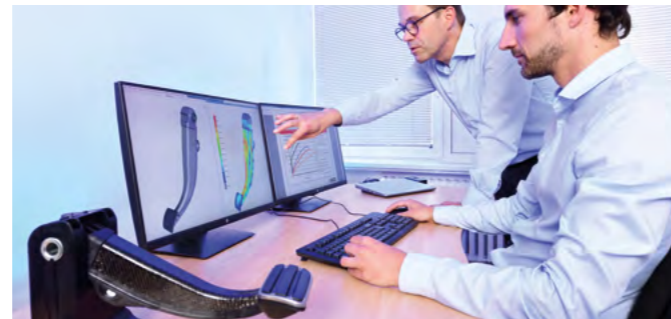
Tepex® semi-finished products are produced individually according to our customers' specifications in a continuous lamination process. This process is based on our many years of experience in the development and production of thermoplastic matrix composites. It allows the complete consolidation of each filament with the matrix material. During production, we monitor that the required material properties are maintained. Tepex® is supplied as sheets with standard widths of up to 1,280 mm and - depending on customer requirements - variable lengths.

## Cutting

We can also produce blanks with customized geometry - matched to the further processing procedure. For this purpose, we work with precision waterjet cutting systems. Based on our customers' drawings, we develop cutting programs in which, on the one hand, we reduce waste to a minimum through clever nesting, and on the other hand, we maintain the required geometric tolerances with maximum cost-effectiveness. This benefits both our customers and the environment. The semi-finished products supplied can be fed directly to the further processing operations, while the resulting offcuts are shredded according to type and recycled into high-quality injection molding granules.

## Processing

Our customers benefit from our comprehensive material and processing know-how in all aspects of fiber-reinforced composites with thermoplastic matrix - no matter what application or industry. We are continuously expanding and enhancing this know-how. Our highly qualified employees contribute to this, as does our cooperation with external processing specialists and academic research institutions. LANXESS relies on trusting partnerships with its customers - from the early stages of product development to the successful delivery of components made of Tepex®. In this way, we help to ensure that our customers have top products in terms of design and performance.



**If you need further information or if something is missing, please contact:**

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Please also consider visiting our website for further information:

**www.tepex.com**

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