PERFORMANCE ENERGIZED BY

Advanced thermoplastic composites

Tepex®

A company of the LANXESS group
Tepex® is a high performance composite laminate system made with thermoplastic polymers. The innovative combination of continuous reinforcing fibres with thermoplastic polymers results in exceptionally high strength and rigidity, coupled with extremely low weight. Tepex® enables cost-effective parts fabrication processes suitable for mass-production, especially in combination with injection molding. Due to its versatility and outstanding property profile, Tepex® addresses the megatrends of our time: green mobility, individual properties and design, enhanced safety and durability as well as sustainable solutions for the protection of resources and the environment. Whenever lightweight design, stiffness and strength, fatigue resistance, energy absorption and functional integration are required in high volume, Tepex® is the material of choice.

Since 2013, Bond-Laminates belongs to LANXESS AG, a leading specialty chemicals company, as a wholly-owned subsidiary. As a part of the High Performance Materials business unit, Bond-Laminates complements LANXESS’ competencies in the field of innovative lightweight materials. LANXESS has a market presence of 52 production sites in 17 countries worldwide. In 2013 LANXESS achieved net sales of EUR 8.3 billion with 17,343 employees. The core business of LANXESS is the development, manufacturing and marketing of plastics, intermediates and specialty chemicals. LANXESS is a member of the leading sustainability indices Dow Jones Sustainability Index (DJSI) World and FTSE4Good as well as the Carbon Disclosure Leadership Index (CDLI).
INDIVIDUAL CHARACTERISTICS

1. Stiffness & Strength
In wood, plants and bones, nature itself has demonstrated that high-strength fibres 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 and ultra low material thickness. Customization of Tepex® properties to individual requirements enable high performance material solutions for almost any 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. 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.

4. Efficient Processing
Tepex® materials are sold as semi-finished goods ready to be processed in press forming 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.

What is your material requirement?

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**Tepex® for Consumer Electronics**

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**Solution specific material design & cost efficiency**

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**Lightweight Design Energized by Tepex®**
Automotive
The automotive sector is facing increasingly strict requirements regarding fuel efficiency and weight reduction. 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. Low processing cycle-times of Tepex® material systems enable cost efficient parts and reliable mass-production processes in the automotive industry.

Industry
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.

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, tablet PCs, notebooks and television sets. These structural properties can be integrated in Tepex® materials with premium surface properties for visible as well as for coated surfaces.

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.
STANDARD MATERIALS
FOR CUSTOMIZED SOLUTIONS

Tepex® dynalite – Maximum strength at minimum weight
The Tepex® dynalite range consists of multiple layers of continuous fibre reinforcements in a matrix of engineering thermoplastics. The continuous fiber structure, fully consolidated with a thermoplastic polymer, provides the maximum possible strength and stiffness. Typical applications are industrial and automotive applications and sporting goods.

Tepex® flowcore – cost effective flow molding
Tepex® flowcore consists of long (30 - 50 mm) glass fibers, similar to traditional glass mat thermoplastic materials (GMT), but based on engineering polymers. In optimizing design, Tepex® flowcore can be combined with Tepex® dynalite to provide stiffeners and ribs for reinforcement. Tepex® flowcore materials can be processed by standard compression molding and are intended for automotive and industrial use when standard GMT and injection molding thermoplastics cannot meet temperature and structural requirements.

Tepex® optilite – Excellent aesthetics combined with maximum strength at minimum thickness
The Tepex® optilite material system contains multiple layers of continuous fiber reinforcements in a matrix of engineering thermoplastics. Strength, stiffness and weight parameters are comparable to those of Tepex® dynalite. In addition, these materials are tailored for applications with superior surface quality, e.g. consumer electronics and sporting goods. Tepex® optilite materials can be customized to meet aesthetic design requirements and provide a competitive edge in fast moving consumer markets.

Tepex® anti-ballistic – superior absorption of ballistic energy
Tepex® anti-ballistic materials based on aramid fabrics are specially designed for a maximum energy absorption-to-weight ratio. The anti-ballistic material system is manufactured in a fully automated process with continuous quality control providing optimized and consistent anti-ballistic performance. Typical applications are helmets and car armoring.

NOMENCLATURE

Tepex® dynalite 108-FG290(4)/45 % – 1.0 mm

<table>
<thead>
<tr>
<th>Fiber volume content</th>
<th>Number of fabric layers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre volume content</td>
<td>Fabric code: see below fabric area weight</td>
</tr>
<tr>
<td>Polymer type: 1 = PA66</td>
<td>2 = PA6</td>
</tr>
<tr>
<td>Fiber type: 100 = Glass</td>
<td>200 = Carbon</td>
</tr>
<tr>
<td>Constitution of the laminate: dynalite, optilite, flowcore, anti-ballistic</td>
<td></td>
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</tbody>
</table>

Bond-Laminates registered trade name

Fabric code: C = Carbon

CUD = Carbon Uni-Directional
RG = Roving Glass
RGUD = Roving Glass Uni-Directional
FG = Filament Glass
FGAL = Filament Glass with Aluminum coating in silver or anthracite
FGc = Filament Glass colored
A = Aramid
RG = Roving Glass Random

EFFICIENCY ENERGIZED BY

Tepex® for industry
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 experts of Bond-Laminates and LANXESS closely cooperate with our customers – and of course ensure that customer specific intellectual property stays protected. Such cooperation ideally starts in an early product development stage so that material design will not only focus on optimum compatibility of fibres and polymers, automated and cost efficient production and quality control at Bond-Laminates, but can also support effective part design and efficient processing of semi-finished Tepex® material in our customer’s manufacturing processes.

Manufacturing

Tepex® materials are manufactured made-to-order in a continuous lamination process based on long-term experience in material design and manufacturing of thermoplastic composites. The proprietary manufacturing process ensures complete consolidation of the individual fibre structure with the thermoplastic matrix. Required material properties are continuously monitored and tested. Being produced in a continuous process Tepex® materials can be delivered as sheets (with a standard width up to 1250 mm and a sheet length that can be optimized per application) or as form-cutted plates ready for processing in compression or injection molding processes.

Processing

Working together with Bond-Laminates, customers can dock into a realm of material and processing know-how about thermoplastic composites in different industries and applications. Bond-Laminates continuously works on enhancing this know-how, e.g. through intelligent networking with processing partners and academic research facilities as well as through its highly trained employees. Bond-Laminates wants to be a trustful partner from the first product design idea to the successful delivery of Tepex® parts — to enable leading edge products with superior performance and design.

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:

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