

Intermediates

Baxxodur systems

When curing makes the difference

Epoxy systems for the
composites industry

 **BASF**
The Chemical Company

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BASF is the world's leading chemical company: The Chemical Company. Its portfolio ranges from chemicals, plastics, performance products and agricultural products to oil and gas. As a reliable partner BASF creates chemistry to help its customers in virtually all industries to be more successful. With its high-value products and intelligent solutions, BASF plays an important role in finding answers to global challenges such as climate protection, energy efficiency, nutrition and mobility.

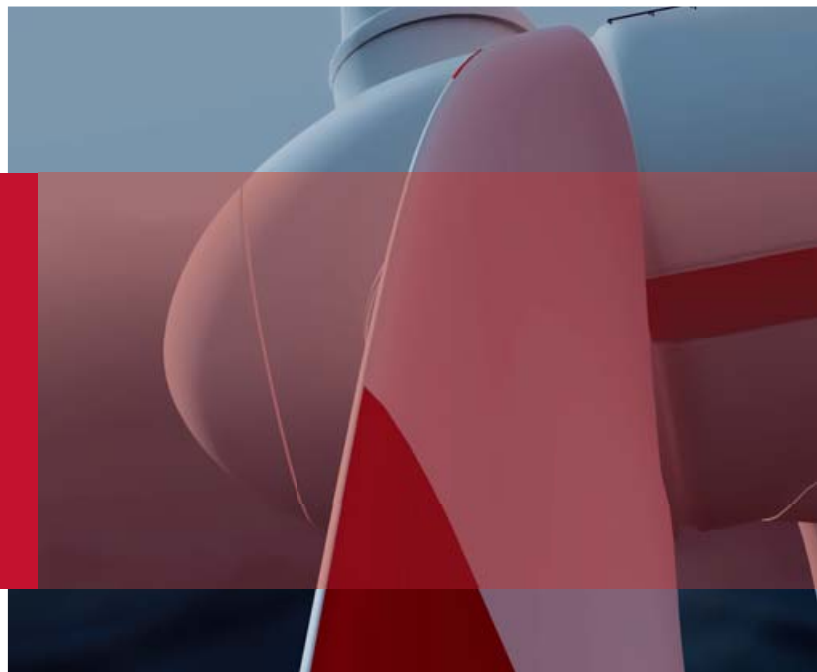
BASF for the wind energy industry

Wind is an important source of renewable energy. BASF supports the wind industry with innovative and reliable high-quality products and solutions for the efficient manufacturing of wind turbine components such as blades, bases and towers.

In addition to the Baxxodur® systems described in this brochure, BASF supplies highly efficient coating and grouting materials.

To find out more about the broad BASF portfolio for the wind industry please visit our industry website:

www.windenergy.basf.com



Baxxodur systems: When curing makes the difference

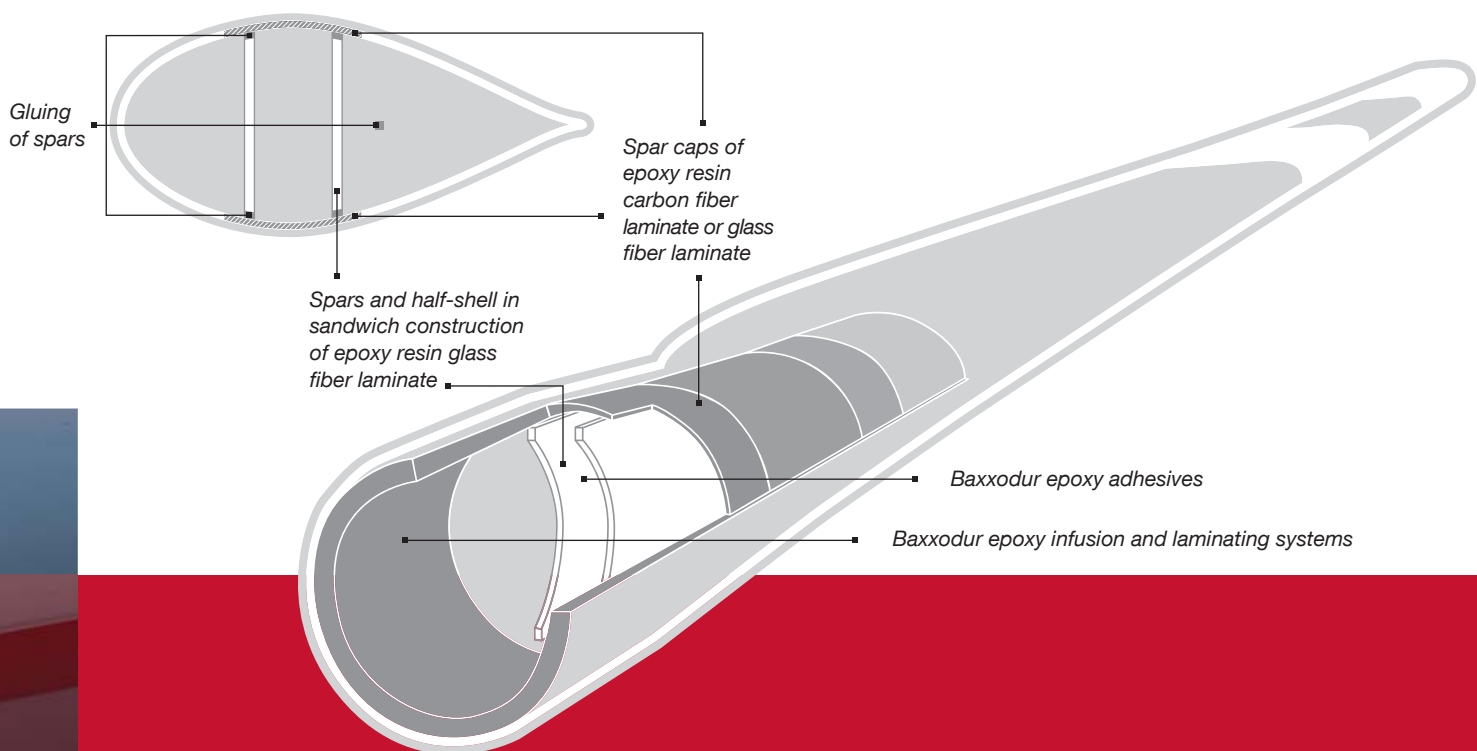


BASF supports the wind industry with innovative and reliable high-quality products and solutions.

BASF offers innovative Baxxodur® systems for epoxy-based composite parts for the wind energy industry.

Each Baxxodur system consists of a carefully designed Baxxodur curing agent formulation and the appropriate epoxy resin formulation that is marketed under the brand name Baxxores®.

Baxxodur systems for composites are based on BASF's own comprehensive portfolio of curing agents that is unmatched in the industry. These curing agents primarily determine the processing and polymer properties of epoxy resin systems.



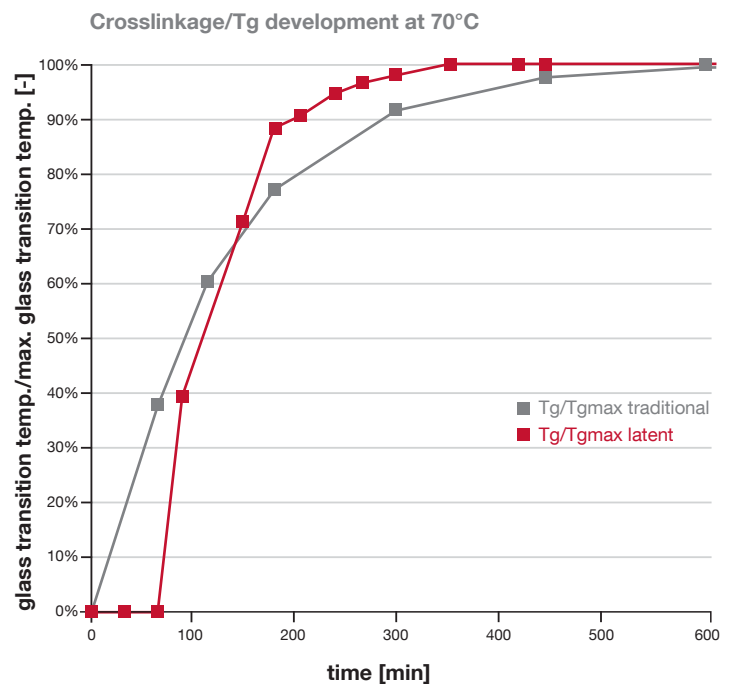
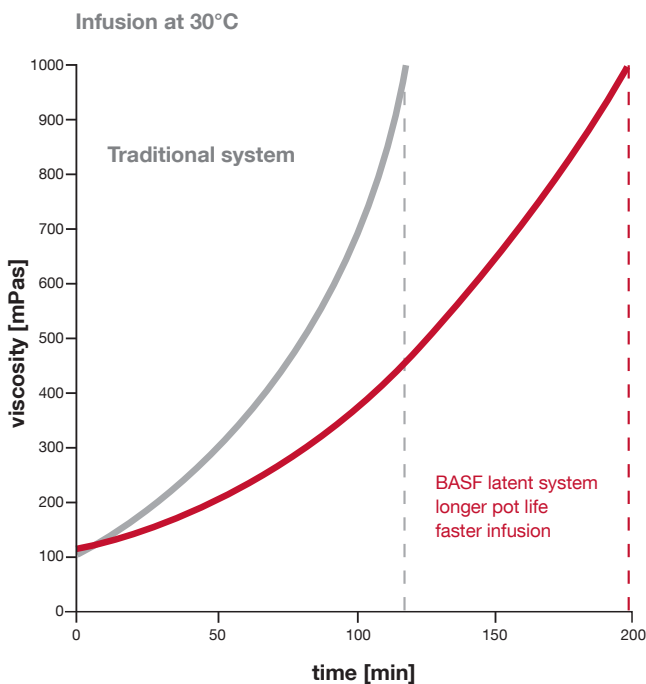


The Baxxodur application laboratory at the Ludwigshafen, Germany, site with large-scale heating tables, infusion and injection units to simulate a variety of processing conditions prevailing at customer facilities.

BASF's Baxxodur portfolio for the production of rotor blades

Customers of Baxxodur systems purchase high-quality products with strong technical support from our composites expert team.

Latent Baxxodur infusion system for composites



- At temperatures below 50°C the Baxxodur 5300 system reacts slowly with a long pot life.
- Therefore the infusion can take place at elevated mold temperatures with very low viscosities.
- Combined with low viscosity, e.g. at 40°C, the slow reactivity enables fast infusion and improved fiber wetting.
- The infusion time can be reduced by around 30%.

- At temperatures above 70°C the Baxxodur 5300 system reaches the final polymer properties faster.
- Latent infusion system reduces curing time by around 30%.

Baxxodur:
Commercial portfolio

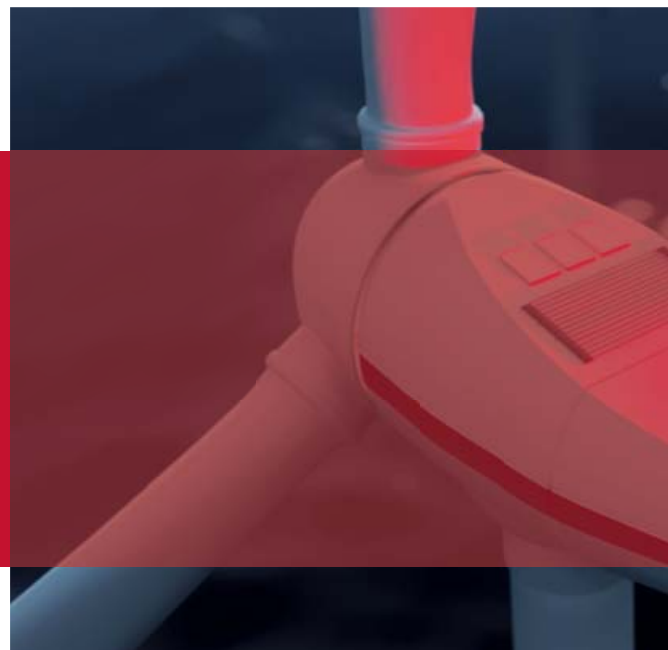
- Laminating systems
- Traditional infusion systems
- Latent infusion systems
- Adhesive pastes
- Tooling systems

**Latent epoxy systems
combine long pot life
with fast curing**

Wind blade producers benefit from BASF's latent Baxxodur systems that solve the inherent dilemma of traditional epoxy systems that either gelate and cure slowly or gelate and cure quickly.



BASF's Baxxodur systems contribute to more efficient processes in the production of heavy-duty composites based on epoxy resins.



Advantages



Customer feedback on Baxxodur latent infusion systems focuses on various aspects:

Faster and deeper infusion of glass and carbon fabrics

- Fast infusion due to late gelation.
- Good fiber wetting also in thick laminates, which makes the systems highly suited for structural parts, e.g. spar caps and root sections.
- Good penetration in compact C-fiber reinforcements.

Faster vitrification

- Fast build up of glass transition temperature and modulus after gelation.

Better exotherm control

- Especially in thick structural parts the latent system shows lower peak temperatures than traditional systems.

Increased composite quality

- Based on its special curing behavior laminate deformations such as exotherm waves in spar caps can be avoided.

High mechanical strength

- Outstanding mechanical performance.
- Proven in numerous qualification processes.

Our customers benefit from producing high-quality and high-strength laminates in less time.



Why you can count on BASF



At BASF's Baxxodur systems application laboratories in Tarrytown (North America, top), Ludwigshafen (Europe, center) and Shanghai (Asia, bottom) the BASF experts study the curing process in detail.

Global production set up with local content

BASF operates production facilities in all major regions and supplies systems with a high content of locally produced materials.

Global customer support

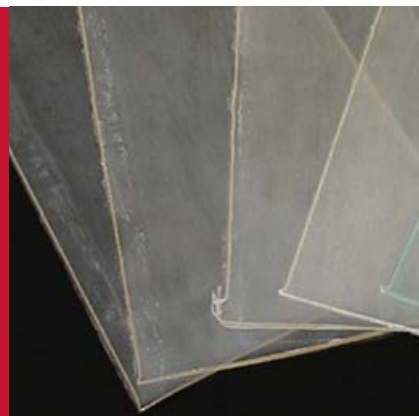
Epoxy systems require detailed instructions for application. For innovative systems that tick differently than traditional systems the need to explain and support is even larger. Therefore BASF has installed customer support teams in the Americas, Europe and the Asia Pacific region to offer high-quality technical support in close proximity to its customers. The teams are supported by local company representatives as part of BASF's global presence.

Expertise

In all regions BASF employs experienced epoxy composite experts. These are supported by a global team through a continuous exchange of up-to-date information.

Dedicated laboratories

With three dedicated epoxy composites laboratories in Tarrytown (North America), Ludwigshafen (Europe) and Shanghai (Asia) we ensure fast response to support customers and introduce innovations. In these application laboratories BASF experts prepare test specimen for qualifications and fine tune the production processes of our customers.



Laboratory specimens based on different epoxy systems. BASF screens the properties in order to optimize the Baxxodur curing agents.



Testing facilities for qualification

Composites expertise within BASF extends far beyond epoxy systems with in-depth experience in thermoplastic and thermoset-based composites. This includes the mechanical testing of neat resins and fiber reinforced laminates with state-of-the-art testing equipment in laboratories, approved by the Germanischer Lloyd. This enables BASF to shorten development time and qualification processes.

Germanischer Lloyd AG, one of the leading certification companies for wind energy facilities, has approved the execution of various tests in BASF-owned laboratories.



Focus on innovation

BASF's strategic goal is to add value for its customers.

Innovation is at the heart of BASF's strategy for its customers in the composites industry. The process of innovation starts with listening carefully to the customers to identify and understand their needs. In the short-term, the experience of the related BASF expert team will often enable it to find solutions based on the current chemical portfolio.

For mid-term solutions, BASF is eager to push the envelope by designing and synthesizing entirely new Baxxodur and Baxxores system components.

BASF's vast experience in chemistry and access to the huge diversity of raw material streams from BASF's chemical Verbund structures continuously open up opportunities for the development of new molecules..

Three-point bend test according to DIN EN ISO 14125

Tensile test according to DIN EN ISO 14129



The mechanical properties of components made of glassfiber-reinforced epoxy resins are determined by means of state-of-the-art testing equipment.

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Baxxodur systems

When curing makes the difference

- Baxxodur epoxy systems for fiber-reinforced composites
- Specifically for the production of rotor blades for wind turbines
- Systematic enhancement of production process efficiency

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