

**Advantex® Glass:
The E-CR Glass for a
Sustainable Future**

Advantex® Glass: Eco-Responsible, Durable and Versatile

Sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs”. It ties together concern for natural eco systems with the social challenges facing humanity. In a marketplace that faces challenges such as the reduction of CO₂ emissions, energy use efficiencies and long service life, it is vital to be able to innovate. 3B the fibreglass company has demonstrated this ability repeatedly, providing glass fibres for cost effective lightweight and sustainable composites solutions, which offer superior product performance, end-of-life management and design flexibility. We, at 3B are committed to developing sustainable innovative solutions with our clients through the definition of high performance glass fibre answers for a wide range of markets and applications.

Everyone at 3B is committed to sustainable development. It drives our spirit of innovation, which translates into the eco-responsibility, durability and versatility of our products. With sustainable development on everyone’s mind, one infinite resource is people’s creativity. Put to good use, it has the ability to find better value, longer-term solutions.



discover your fibreglass world



Birkeland, Norway

Breakthrough Innovation

Advantex® Glass is the result of a breakthrough in fibreglass formulation and manufacturing technology.

The recognised benchmark in the glass fibre industry for clean manufacturing, Advantex® Glass contains no added boron or fluorides. This is a perfect example of an eco-responsible solution combining pollution prevention with high energy.

Meeting the specifications of E-CR glass standards (ASTM D578 & ISO 2078), Advantex® Glass is an Electrical & Corrosion Resistant glass that brings durability to your composites parts through superior corrosion resistance to acid, water and alkaline environment. Compared with traditional E-Glass, Advantex® Glass technology leads to higher performance and therefore material costs savings.

3B offers reliable and versatile reinforcement solutions with Advantex® Glass for a wide range of composite applications and markets.

Advantex® Glass:

The green solution for the blue planet

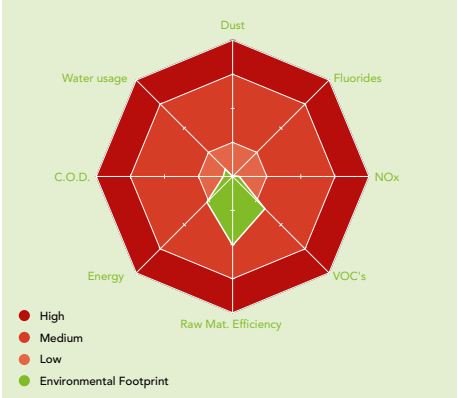
To produce glass, the minerals have to be melted at a temperature of around 1650°C. To ease the melting process, traditional E-Glass formulation contains added melting agents such as boron and fluorides. Unfortunately, the use of such melting agents is detrimental to the environment as most of those agents will be present in the gas emissions.

A drastic reduction of these manufacturing emissions is now possible with Advantex® Glass, thanks to an advanced melting technology and a patented formulation that does not rely on adding boron or fluorides.

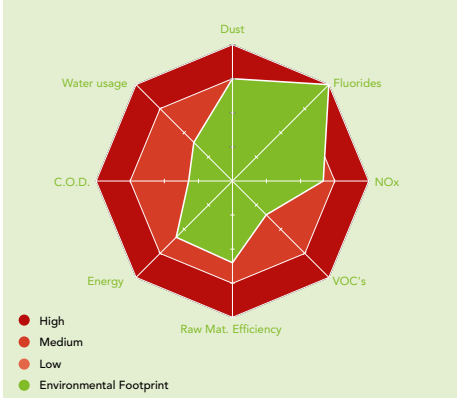
The graphs in the right compare the environmental footprints of 3B's Advantex® Glass manufacturing facility versus traditional E-Glass manufacturing facility for an equivalent production of glass.

3B is a leading European glass fibre producer, and operates two state-of-the-art, eco-friendly glass fibre manufacturing facilities in Battice and in Birkeland, with a top priority to respect the surrounding environment.

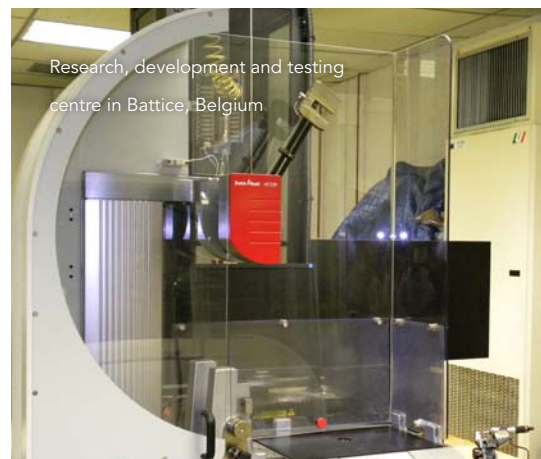
Advantex® Glass Manufacturing Platform



Traditional E-Glass Manufacturing Platform



Battice, Belgium



Research, development and testing centre in Battice, Belgium

3B Science & Technology center also located in Battice is hosting our Innovation & Business Development teams. Both teams' primarily focus being development of innovative & sustainable solutions.

Advantex® Glass

Advantex® Glass for Durability in Composites

The life of a composite part is becoming increasingly challenging. This calls for the development of new composite materials with exceptional and extremely durable properties.

Looking for higher temperature resistance, higher corrosion resistance or better static and long term fatigue properties? Look at Advantex® Glass.

Advantex® Glass properties

Property	Test Method	Unit	Advantex® Glass	E-Glass
Chemical Composition			No added Boron / Fluorides	Added Boron / Fluorides
Softening point	ASTM C338	°C	916	830-860
Refractive Index			1.56-1.57	1.54-1.56
Fibre weight loss in 10% H ₂ SO ₄ (100 hours @ 96°C)			5.5%	> 40%
CLTE (0°C to 300°C)	ASTM D696	10 ⁻⁶ °K ⁻¹	6	5.4

Advantex® Glass fibre properties and advantages in thermosets & thermoplastics

Property in thermosets	Test Method	Unit	Advantex® Glass	E-Glass
Tensile Strength*	ASTM D2343-08	MPa	2200-2600	2000-2500
Tensile Modulus*	ASTM D2343-08	GPa	81-83	74-80

* Representative values of 17µm 2400 tex Advantex® Glass fibre, epoxy resin impregnated

Higher stiffness and strength make Advantex® Glass the material of choice when optimum properties are needed along load bearings.

Property in thermoplastics	Test Method	Unit	Advantex® Glass	E-Glass
Tensile Strength*	ISO 527-1-10	MPa	255-260	240-245
Tensile Modulus*	ISO 527-1-10	GPa	16.8-17.1	15.5-16

* Representative values of PA compound heat stabilized reinforced with 50% GF chopped strand (10µm; 4mm).

Test made with chopped strand coated with the same sizing formulation.

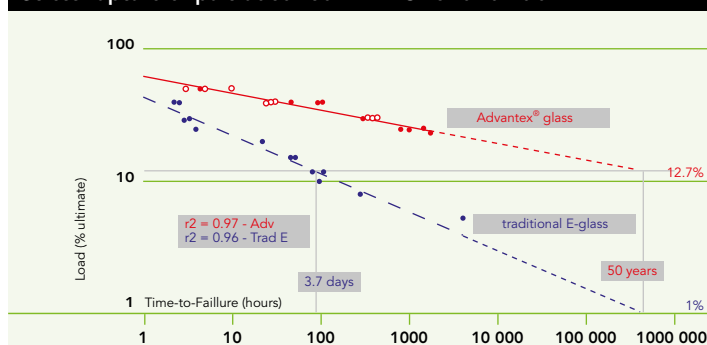
Stiffness advantages of Advantex® glass has been validated in a wide range of thermoplastic resins

(PP, PBT, Styrenics, High T polymers, etc.)

Acid corrosion resistance properties

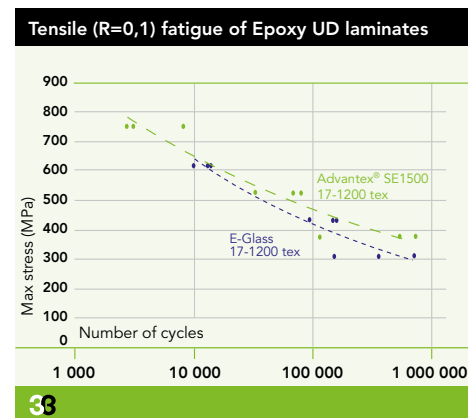
The chart illustrates the stress corrosion resistance of a pultruded rod made with an iso polyester resin and a glass roving content of 75%. The static load was around 1100 MPa. It can be seen that, in a 1N chloridric acid environment at room temperature (23°C), to reach a 50-year service, the stress level should not exceed 12.7% of the static strength. At such stress levels the E-glass rod would only survive 3.7 days.

Stress rupture of pultruded rod in 1N Chloridric Acid



in figures

Fatigue performance



The upper chart illustrates fatigue performance obtained on laminates made with epoxy resin and unidirectional fabrics. It can be seen that Advantex® Glass fibre improves fatigue performance by half a decade.

Versatile markets and applications ...

Energy

Benefits

- High corrosion resistance
- Very high fatigue properties and high stiffness

Ideal choice for

- Optimized windmill blades (onshore & offshore)
- Tidal blades



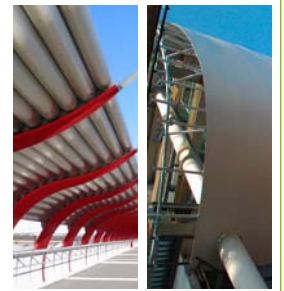
Infrastructure & Construction

Benefits

- High corrosion resistance
- Strength-to-weight ratio

Ideal choice for

- Sewer & chemical line pipes
- Tanks for chemicals
- Architecture
- Pipe rehabilitation



High Pressure Vessels

Benefits

- Strength-to-weight ratio
- High corrosion resistance
- High fatigue resistance

Ideal choice for

- LPG & CNG cylinders



Electrical Insulators

Benefits

- Resistance to brittle fracture during stress corrosion

Ideal choice for

- High end insulators' core materials compliant with IEC 62217 standard



Heat & Thermal Insulation

Benefits

- Resistance to high temperature
- Corrosion resistance

Ideal choice for

- Exhaust muffler systems



Sport & Leisure

Benefits

- Strength-to-weight ratio
- Corrosion resistance

Ideal choice for

- Skis & ski poles
- Boat hulls



From Energy to Infrastructure & Construction, from High Pressure Vessels to Electrical Insulators, from Heat & Thermal Insulation to Sport & Leisure, 3B contributes to of the most high-end composites technologies and applications with its Advantex® Glass solutions.

Further information on these solutions is available on request from:

www.3B-fibreglass.com

... through versatile product portfolio

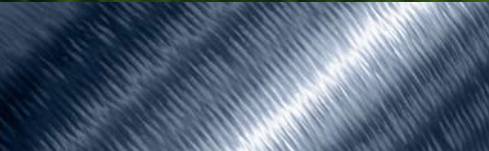
discover your fibreglass world



product portfolio



- **Chopped Strand:** bundles of **Advantex®** Glass filaments chopped into specified lengths. Coated with a finish that maximises processability and end-use performance properties of thermoplastic and thermosets composites. Ideal for compounding and injection moulding technologies.



- **Direct Roving:** bundles of **Advantex®** Glass filaments gathered into a continuous single strand. Coated with a finish that maximises processability and end-use performance properties of thermoset and thermoplastic composites. Material of choice for pultrusion, filament winding, D-LFT, weaving and knitting technologies.



- **Continuous Filament Mat (CFM):** a non-woven mat made out of **Advantex®** filaments, comprising of continuous fibres randomly oriented in multiple layers. Glass fibres are bonded with a silane-coupling agent and layers are held together with an appropriate binder. In use as a flow media in fabric's design and in press moulding.



- **Wet Chopped Strands:** coated wet bundles of **Advantex®** Glass filaments chopped into specified lengths. Engineered to disperse easily in water-based bonding systems for production of non-wovens.



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formance. The user, by accepting the products described herein, agrees to be responsible for thoroughly testing any application to determine its suitability before committing to production. It is important for the user to determine the properties of its own commercial compounds when using this or any other reinforcement.

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