



**HiPer-tex™ Fibre:
The High Power
Performer**

the glass fibre benchmark just moved to a higher level

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 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.

The new HiPer-tex™ fibre:

HiPer-tex™ high performance fibre is the result of a recent groundbreaking manufacturing development. One that combines the technological advancements of a patented glass formulation, which respects the environment with new and more optimised melt fiberizing and sizing technologies. Today, this translates into the possibility to produce high performance HiPer-tex™ fibre in a high-capacity production platform, while delivering economies of scale.

The recognised benchmark in the glass fibre industry for clean manufacturing, HiPer-tex™ fibre does not contain added boron or fluorides. This is a perfect example of eco-responsible, integrated pollution prevention, combined with the highest energy efficiency converging in an optimised process.

HiPer-tex™ fibre also delivers a step change in performance for users of glass-reinforced composites materials. Compared to traditional E-Glass, HiPer-tex™ fibre delivers overall superior performance:

- Up to 30% higher strength
- Up to 17% higher stiffness
- 30% lower CLTE
- 10 times longer life time in fatigue
- Significantly higher corrosion resistance
- Significantly higher temperature resistance



figures that challenge the norm

A composite part leads an increasingly challenging life. This calls for the development of new composite materials with exceptional and extremely durable properties. HiPer-tex™ fibre is one of 3B's solutions that address these challenges.

HiPer-tex™ fibre properties

Property	Test Method	Unit	HiPer-tex™ fibre	E & E-CR Glass
Chemical Composition			No added Boron/ No added Fluorides	-
Softening point	ASTM C338	°C	960	830-916
Refractive Index			1.53-1.54	1.54-1.57
Fibre weight loss in 10% H ₂ SO ₄ (100 hours @ 96°C)		5%		> 40% for E-Glass 5.5% for E-CR Glass
CLTE (0°C to 300°C)	ASTM D696	10 ⁻⁶ °K ⁻¹	4.1	5.4-6

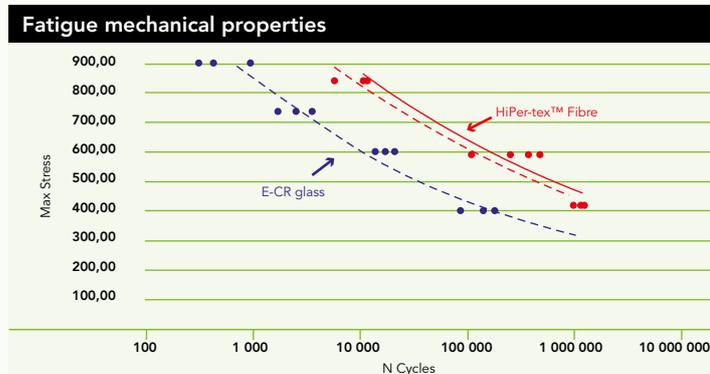
Impregnated HiPer-tex™ fibre properties

Property	Test Method	Unit	HiPer-tex™ fibre	E & E-CR Glass
Tensile Strength*	ASTM D2343-08	MPa	2800-3400	2000-2600
Tensile Modulus*	ASTM D2343-08	GPa	89-91	74-83

* Representative values of 17µm 2400 tex Glass fibre, epoxy resin impregnated and depending on grades

Fatigue mechanical properties

- Comparison of E-CR glass and HiPer-tex™ fibre
- Epoxy unidirectional laminates
- Tension/tension ratio: 0,1
- HiPer-tex™ fibre improves fatigue performance by one decade
- Courtesy of CRM Liège



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Acid corrosion resistance properties

- Corrosion resistance of HiPer-tex™ fibre
- Mimicked A14 Acid Environment test of United Nation R110 regulation
- Measurement of residual flexural properties of 100 hour immersed laminates in 30% H₂SO₄ solution @ RT. 35% strain level.
- HiPer-tex™ fibre is suitable for applications in corrosive environment

Acid environment test

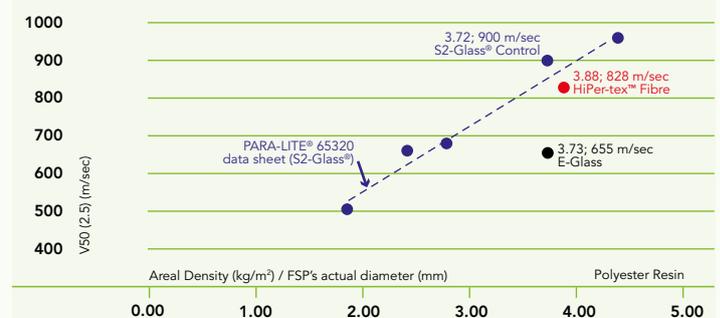
	Strength (MPa)	Residual Strength (MPa)	Residual Strength (%)	Modulus (GPa)	Residual Modulus (GPa)	Residual Modulus (%)
E-Glass 77,6% Wf	1497	0	0	50.6	0	0
HiPer-tex™ Fibre 79%Wf	1791	1659	92	56.5	56.4	99

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Impact resistance properties

- V50 Comparison on polyester laminates reinforced with E-Glass, S2-Glass® and HiPer-tex™ fibre.
- 5.56 mm FSP
- Tested at Banc Officiel d'Epreuve of St. Etienne (France)
- S2-Glass® is a register trademark of AGY
- Courtesy of VonRoll

Stanag 2920 - 1.1 gr 5.56 FSP



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a powerful and flexible portfolio

From Aerospace to Ballistic protection, from High Pressure Cylinders to Marine, from Sport and Infrastructure, to emerging new markets like Wave and Tidal Power, 3B supplies some of the most high-end composites technologies and applications with its HiPer-tex™ fibre solutions.

High performance HiPer-tex™ fibre is available in in Direct Roving form i.e. bonded bundles of filaments gathered into a continuous single strand. Pultrusion, filament winding and weaving and knitting technologies reveal HiPer-tex™ fibre's maximum properties. Specific chemical sizings are used to optimise the processing characteristics and performance of the finished parts.

HiPer-tex™ fibre in use ...

For detailed information, consult our specific brochures on 3B website www.3B-fibreglass.com



High Pressure Vessels

HiPer-tex™ high performance fibre answers the needs for high strength, high impact resistance, low weight and low system costs needed for high pressure vessels.

HiPer-tex™ fibre benefits include strength-to-weight ratio, corrosion resistance, and extremely high fatigue resistance.

- CNG cylinders approved to ECE R110
- Light weight aerospace cylinders
- Paintball cylinders

Hard Armour Ballistic Protection

HiPer-tex™ high performance reinforcement provides substantially increased energy absorption levels, making it ideal for ballistic panels, spall liners, projectile protection and other armour applications.

HiPer-tex™ fibre benefits include lightweight, high impact resistance.

- Stand alone panels (hand gun protection, Spall liners)
- Add-on armor backing (Stanag 4569 solutions)



Energy

Wind energy has become an established and mature contributor to the planet's energy supply. Naturally, the wind power industry has turned to 3B for its expertise in high performance fibre composites.

HiPer-tex™ fibre benefits include high corrosion resistance, very high fatigue properties and high stiffness, making it the ideal choice for optimised windmill blades (onshore & offshore) and tidal blades.



Sport & Leisure

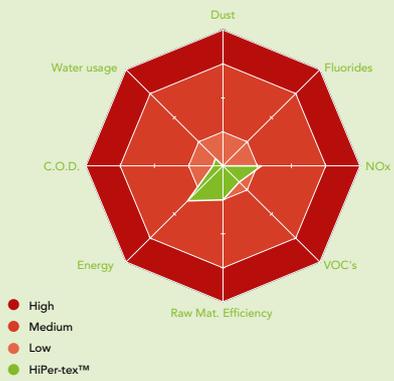
Reaching new limits is now 'mission possible' in sports and recreational activities. Meeting the 'keep it light for racing and load it up for cruising', marine architects' challenge now becomes a reality.

HiPer-tex™ fibre benefits include strength-to-weight ratio, corrosion resistance, fatigue and impact performance.

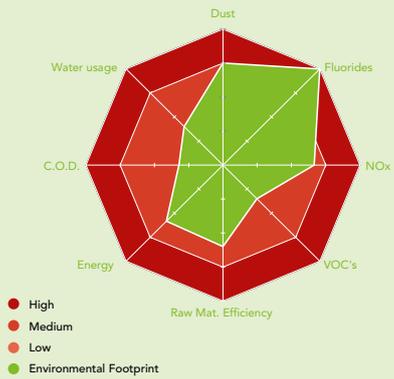
- Boat structures
- Hockey sticks
- Sport shoes



HiPer-tex™



Traditional E-Glass Manufacturing Platform



HiPer-tex™ Fibre: The green solution for the blue planet

To produce glass, the minerals have to be melted at a temperature of 1650°C.

To ease the melting process, 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 them will be present in the gas emissions.

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

The graphs on the left compare the environmental footprints of 3B's HiPer-tex™ fibre manufacturing facility versus 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 Birkeland (Norway) and Battice (Belgium), with a top priority to respect the surrounding environment.



Birkeland, Norway

discover your fibreglass world



discover your fibreglass world



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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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