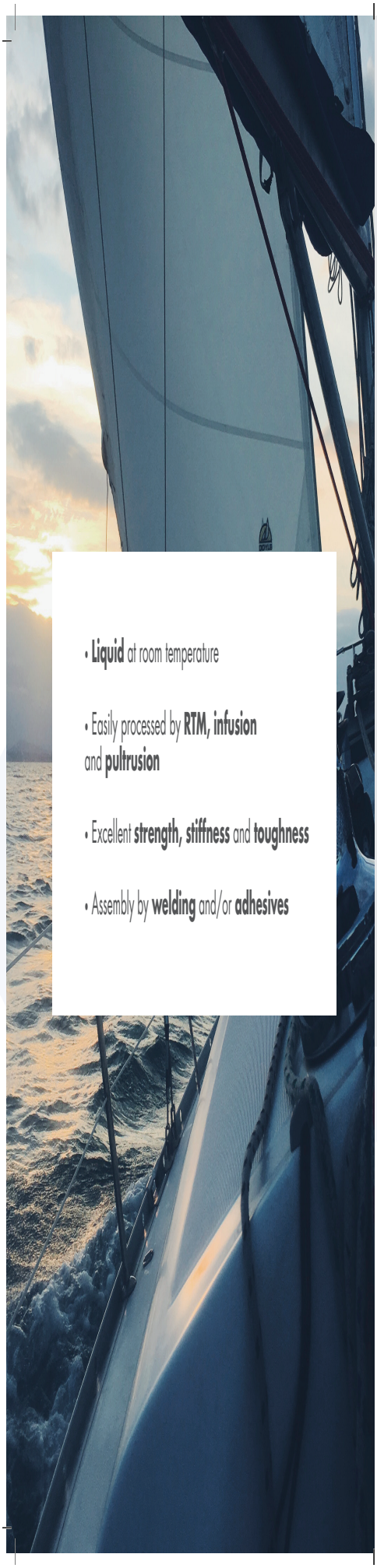

- **Liquid** at room temperature
- Easily processed by **RTM, infusion** and **pultrusion**
- Excellent **strength, stiffness** and **toughness**
- Assembly by **welding** and/or **adhesives**

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A global chemical company and France's leading chemicals producer, Arkema is building the future of the chemical industry every day. Deploying a responsible, innovation-based approach, we produce state-of-the-art specialty chemicals that provide customers with practical solutions to such challenges as climate change, access to drinking water, the future of energy, fossil fuel preservation and the need for lighter materials. With operations in more than 50 countries, some 19,700 employees and 13 research centers, Arkema generates annual revenue of 7.7 billion, and holds leadership positions in all its markets with a portfolio of internationally recognized brands.

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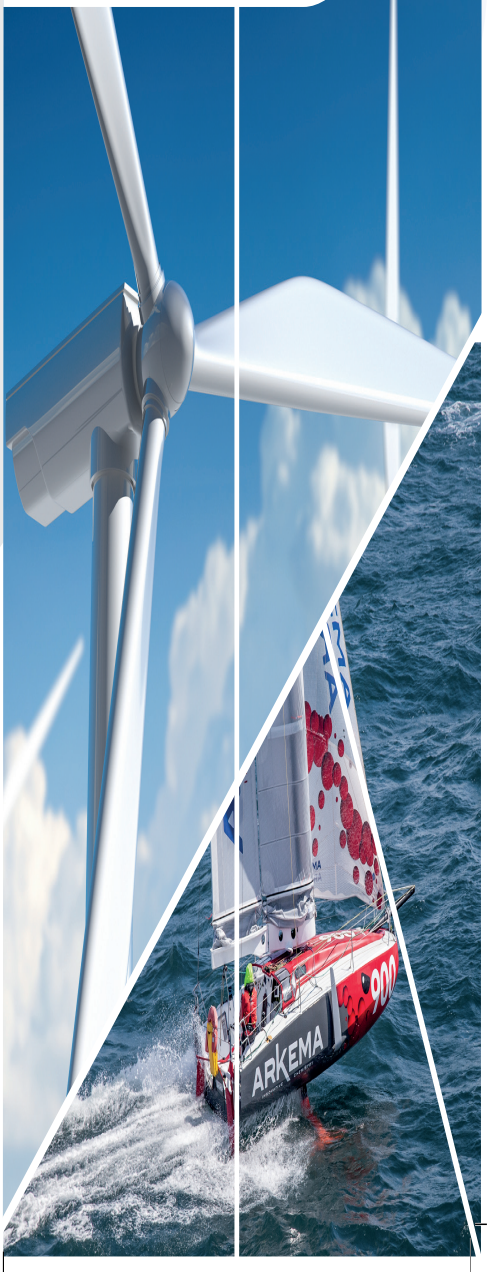
Liquid thermoplastic resin for tougher composites

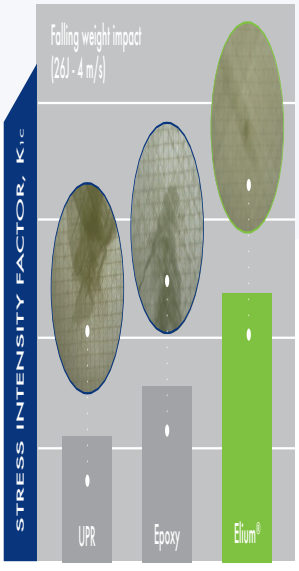


Elium® resins are innovative materials for the production of thermoplastic composites reinforced by continuous glass, carbon or natural fibers.

The resulting parts show mechanical properties similar to epoxy composites while presenting **the major advantages of high impact resistance, post-thermoformability**, recyclability and offers new material assembling possibilities.
These results enable the production of structural composite parts in such industries as automotive, wind energy, sports, etc.

Shore D hardness	85 - 90		ISO 868
Coefficient of linear expansion	0.065	mm/m/°C	ISO 2155-1
Fracture toughness stress intensity, K_{Ic}	1.2	$MPa.m^{0.5}$	ISO 13586
Elongation at break	2.8	%	ISO 527
Flexural strength	111	MPa	ISO 178
Flexural modulus	2.91	GPa	ISO 178
Tensile strength	66	MPa	ISO 527
Tensile modulus	3.17	GPa	ISO 527
Compression strength	116	MPa	ISO 14126
Compression modulus	3.83	GPa	ISO 14126

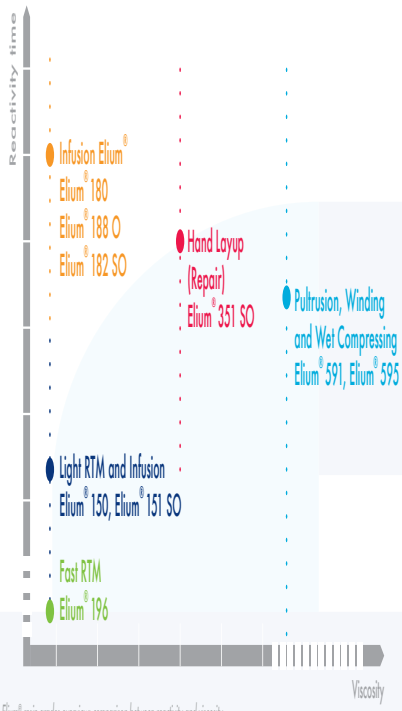
Typical cured resin non reinforced properties (post curing 24 h at 60 °C)



Elium® resins can be processed by RTM, Infusion and pultrusion depending on the number of parts to be manufactured per day and the specifications of the part.

Elium® resins are processed on similar equipment to that used today for thermoset composites, with similar polymerization cycle times and conditions.

Typical impact behaviour compared between Polyester, Epoxy and Elium® in neat resin (figures) and composite (pictures)



Elium® resin grades overview: comparison between reactivity and viscosity

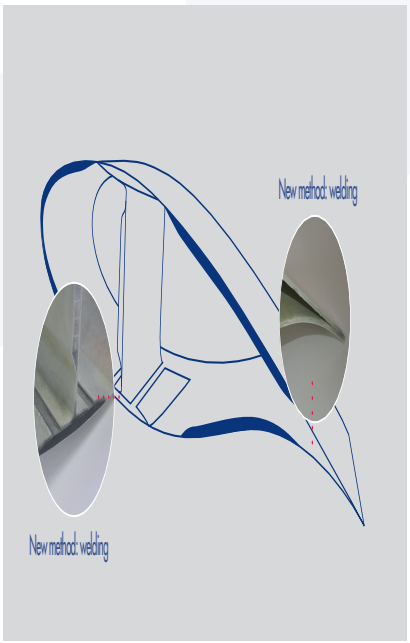
Resin Type	Application	Process	Viscosity [mPas]	Processing Temperature [°C]	Processing Time [min]	e.g. Peroxide
Elium® 150	Sport Medicine	Infusion, Light RTM	100	20 - 60	20 - 30	Dibenzoyl Peroxide
Elium® 180 Elium® 188 O	Wind Marine B&C	Infusion	100	20 - 60	45 - 60	Dibenzoyl Peroxide
Elium® 151 SO	Marine Industrial	Infusion, Light RTM	100	20 - 100	20 - 30	Methyl Ethyl Ketone Peroxide
Elium® 182 SO	Sport Industrial	Infusion	100	20 - 100	45 - 60	Methyl Ethyl Ketone Peroxide
Elium® 351 SO	Wind Marine	Hand Layup	300	20 - 60	Highly Adjustable	Methyl Ethyl Ketone Peroxide
Elium® 591 Elium® 595	Automotive Wind Industrial	Pultrusion, Winding, Wet Compressing	500	20 - 115	Adjustable	Peroxide blend
Elium® 196	Automotive	Fast RTM	100	90 - 120	2 - 10	Peroxide blend
Elium® C 445	Solid Surface	Casting	400	20	45 - 70	Tert Butyl Monoperoxy Maleate

Specifications of some Elium® grades. (If a lower or higher reactivity infusion or injection resin is needed, please contact your Arkema representative for more information.) The presented Peroxide systems are commonly used in Europe. For specifications in US or Asia, please contact your Arkema representative for more information.

Fiber-reinforced **Elium® resin** parts can be thermoformed with heat and pressure. This process requires the heating of the consolidated part at 180 - 200°C for a few minutes, and the compression at a pressure between 5 and 20 bars depending on the reinforcement type and the thickness of the part.

Fiber-reinforced composites made with **Elium® resins** can be assembled with adhesives. The SAF® 30 adhesive, from AEC Polymers, is recommended for structural bonding. A cohesive rupture is obtained according to the EN-1465.

To use the advantage of the thermoplastic behaviour of **Elium® resin** an assembly by welding is also possible. This process requires the heating of the two consolidated parts at 180 - 200°C for a few minutes, followed by compression till it solidifies again.



Welded wind blade section without adhesive. (Project in cooperation with Pontis Engineering)

The Composite parts made out of **Elium® resin** can be recycled after End-of-life in two different ways. The first one would involve grinding and compounding to use as chopped fiber compounding resin and the second would be a thermolysis process which allows the recovery of fibers and the monomers by depolymerisation.

The shelf life of the **Elium® resins** in original sealed container is 6 months guaranteed at a temperature not higher than 25 °C.
For further information we advise you to read carefully the current Safety Data Sheet or get in contact with your Arkema representative.