Epsilon™
ENGINEERED COMPOSITE RESINS

Carbon Fiber Has Met Its Match!

Finding a Better Way

Epsilon™ 99100 is a durable and effective benzoxazine resin system that significantly enhances mechanical performance and durability, with high temperature performance and low flammability properties. Epsilon™ 99100 is intended for use in resin transfer molding (RTM) and vacuum assist resin transfer molding (VARTM) applications. It is particularly suitable for the manufacture of large parts due to the broad process window, low exotherm, and low resin shrinkage on cure.

For more information (including material safety and technical data sheets, and application information), visit our website:

www.henkelepsilonresin.com

Please visit us on the web to learn more about:
Henkel Aerospace Products: www.henkelna.com/aerospace
Henkel Composite Assembly: www.henkelcompositeassembly.com

Henkel

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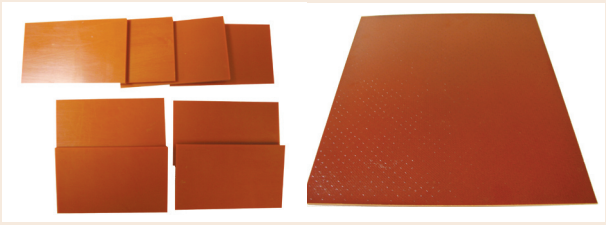
FEATURES AND BENEFITS

Epsilon™ 99100 is a unique resin system in that it is stable at ambient temperatures for over a year as a one-part resin. This reduces the cost of processing, storage, and shipment. Additional features with related benefits include:

- High hot/wet property retention – higher service temperatures to enable a wide range of aircraft applications
- Low heat release during cure – allow for manufacture of large parts, lowers residual stresses
- Broad processing window – great for large parts and intricate shapes
- Viscosity stability – long injection window for large parts
- Low cure shrinkage – improved translation of strength in final part
- Fire retardant – suitable for aircraft fuselage and interior applications
- Improved UV resistance – reduced discoloration compared to epoxies
- Good thermal resistance – acceptable for high temperature areas

The Epsilon™ benzoxazine family of resins has a unique orange color after cure. To the left are neat resin castings and to the right is a glass laminate used in FST testing.



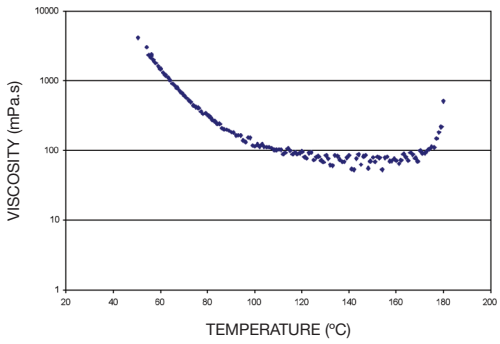
STRUCTURAL AEROSPACE APPLICATIONS

- Designed to provide equivalent performance to prepreg structural applications
- Large part assembly, including: aircraft wings, fuselages, and flight control surfaces
- One-part stability allows for easy processing, as well as reduced cleanup and set up for continuous shop floor applications

EPSILON™ 99100 PROCESSING

PROCESS	INJECTION TEMP	INJECTION PRESSURE GRADIENT	INJECTION VISCOSITY	CURE TEMPERATURE / TIME	CURE PRESSURE	CURE RAMP RATE
RTM Process	110ºC (230ºF)	1-2 bars	<100 mPa.s	90 minutes @ 180ºC (356ºF)	6-7 bars	0.5ºC / min (1ºF / min) to cure temp
VARTM Process	110ºC (230ºF)	1 bar (full vacuum)	—	90 minutes @ 180ºC (356ºF)	0.5 bars (vacuum)	0.5ºC / min (1ºF / min) to cure temp

Viscosity Profile of Epsilon™ 99100 Resin



EPSILON™ 99100 PROPERTIES

RESIN PROPERTIES	VISCOSITY AT 110ºC (230ºF)	MINIMUM VISCOSITY	HEAT OF CURE	DEGREE OF CURE 90 minutes @ 180ºC (356ºF)	DENSITY	WEIGHT CHANGE 72 hrs boiling water	Tg ONSET DRY	Tg ONSET 72 hrs boiling water	FLEXIBLE STRENGTH	FLEXIBLE MODULUS
Uncured	104 mPa.s	60 mPa.s	370 J/g	—	—	—	—	—	—	—
Cured	—	—	—	>93%	1.22 g/cm^5	2.6%	203ºC (397ºF)	166ºC (330ºF)	131 mPa (19 ksi)	4.1 GPa (.65 Msi)

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Quality from Henkel