EPIKOTE™ Resin MGS® BPR 135G3-Neo
EPIKURE™ Curing Agent MGS® BPH 1355G-Neo
EPIKURE™ Curing Agent MGS® BPH 137GF-Neo

CHARACTERISTICS

Approval	DNV (pending for 1355G-Neo)
Application	Secondary bonding of FRP to FRP and various materials Production of rotor blades for wind energy turbines, shipbuilding, sporting goods, molds, tools and other devices
Operational temperature	-60°C up to 80°C with heat treatment
Processing	at temperatures between 10°C and 45°C
Features	long open time and high tolerance against environmental humidity excellent sag resistance at elevated temperature
Storage	Shelf life of at least 24 months in originally sealed containers

APPLICATION

Adhesive EPIKOTETM MGS® BPR 135G3-Neo is a solvent free epoxy based bonding paste with a wide range of applications. It is suitable for bonding laminates and wood and appropriately prepared metallic and mineral components.

The system has an excellent sag resistance even at elevated temperatures and is particularly suitable for adhesion to vertical surfaces and wider gaps. The adhesive resin does not bleed out of vertical gaps even if parts are immediately cured at high temperatures.

Surface Preparation

No special surface preparation is required. If bonding surfaces shall be primed, a liquid mix of laminating resin should be used. Priming with bonding paste is not recommended and should be avoided.

Mixing

Adding more or less curing agent outside the permissible tolerance range will not speed up or slow down the reaction rate (gel time, pot life or working time) – it will cause incomplete curing of the bonding paste which cannot be corrected in any way by reworking.

Resin and curing agents have different color to facilitate visual verification of homogenous mixture. The color is only a visual aid and not precisely specified. Therefore, batch-to-batch variations are possible.

Both components must be mixed very thoroughly, pay special attention to the walls and the bottom of the mixing container. Manual mixing of larger quantities of resin and curing agent is very difficult. In order to guarantee good mixing of large volumes in production, the use of suitable mixing machines is essential.

Application & Curing

The recommended temperature for mixing and application is between 20 – 30°C. The use of EPIKOTE™ Resin MGS® BPR 135G3-Neo at elevated temperatures is possible but will shorten pot life. A temperature increase of 10°C will halve the pot life. Water (e.g. ambient conditions with high humidity) causes an acceleration of the resin / curing agent reaction.

The part surface temperature should be < 35°C when bonding paste is applied. Higher surface temperatures may be chosen, depending on selected curing agent and bond line thickness but should be verified by testing.

Any excessive bonding paste (squeeze-in, squeeze-out) should be removed from the bond lines before cure. Parts should be heated at a slow temperature rate to minimize internal stresses during the curing process. For thick bond lines (typically > 10 mm) a stepped cure temperature profile is recommended due to exothermic reaction of the bonding paste.

Open time and processing times must be checked with the required bonding geometry, surface and environmental temperatures, humidity and peel ply in production.

Do not mix large quantities – particularly of highly reactive systems – at elevated processing temperatures. As the heat dissipation in the mixing container is very slow, the contents will be heated up by the reaction heat (exothermic resin-curing agent reaction) rapidly. This can result in temperatures of more than 200°C in the mixing container, which may cause smoke-intensive burning of the resin mass.

Bond lines

Bond line thickness control and removal of excessive adhesive are of key importance for any structural adhesive joint application to obtain consistent and optimal adhesive joint properties with respect to exotherm, internal stresses and crack formation. For larger parts, as found in boat and wind turbine blade production, bond line thicknesses of 1-10 mm are generally targeted. In applications where bond line thicknesses may be greater than 10 mm, the effects of higher exothermic temperatures and lower adhesive joint properties should be evaluated.

Storage

The resin and curing agents should be stored at room temperature in conditions where moisture is excluded and kept in the original containers tightly closed. Under these conditions, storage for a minimum of 24 months from the date of production is possible.

The products do not crystallize at storage temperatures between 10°C and 30°C.

In rare cases, some slight liquefaction can be observed on top of the material. This is a natural phenomenon for pastes and can occur in case of an extended exposition to higher temperatures over longer time, e.g. during transportation and storage. Therefore, Westlake Epoxy does not recommend storage temperatures above 30°C and storage under direct sunlight.

Note, even in that state the product will retain its overall performance.

TYPICAL PROPERTIES

Property	Unit	Resin BPR 135G3-Neo	Curing Agent BPH1355G-Neo	Curing Agent BPH137GF-Neo
Translucent color		Yellow	Blue	Blue
Density[1)]	g/cm³	approx. 1.31	approx. 1.13	approx. 1.13
Yield Strength[2)]	Pa	800 ± 300	350 ± 150	700 ± 250
T_G 4 h @ 70 °C	°C		76	74
T_G pot.	°C		> 85	> 90
Pot life[3)]	min		approx. 35 … 45	approx. 150 … 230
Mixed Density[1)]	g/cm³	approx. 1.2 … 1.3		
Cured Density[1)]	g/cm³	approx. 1.27 … 1.37		
Mixed Yield Strength[2)]	Pa	approx. 800 ± 300		

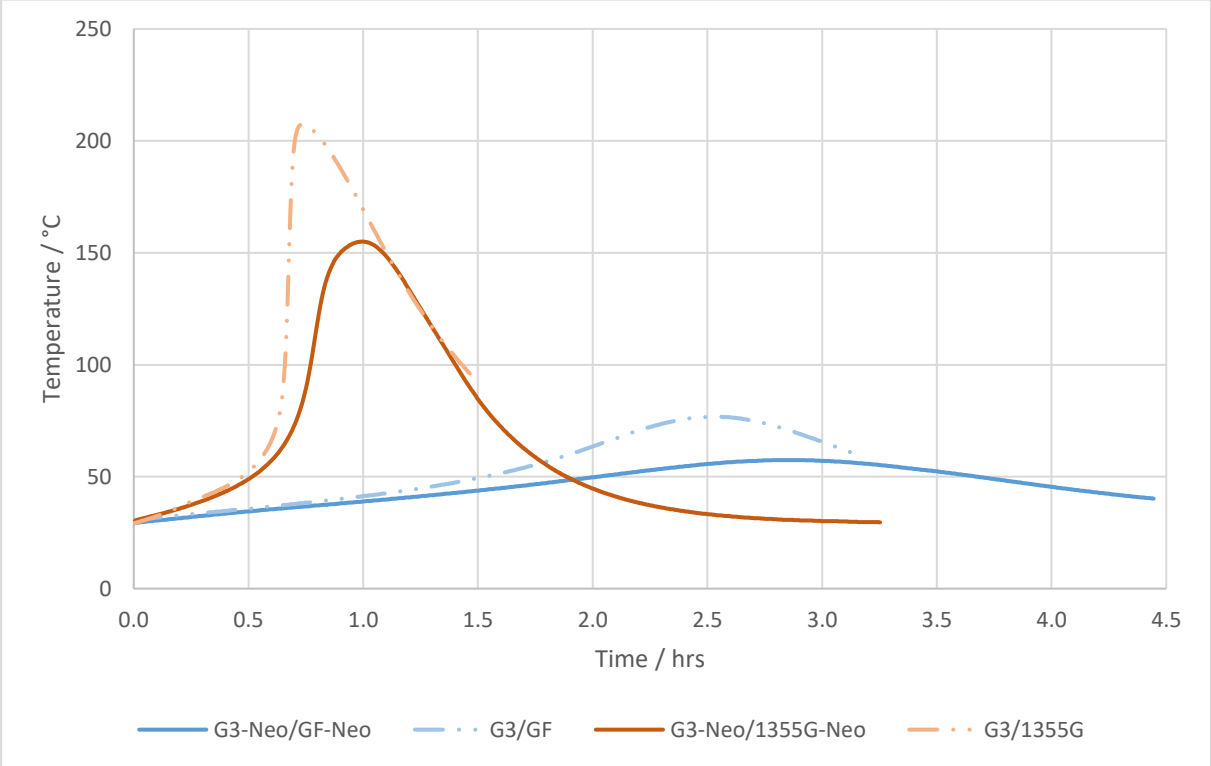
Measuring conditions:
1) measured at 23°C
2) Oscillating measurement. Plate-plate, 25 mm, gap 0.5 mm, 23 °C, γ = 0.01 … 60 % log, ω = 10/s
3) 100g mixture of BPR 135G3-Neo and curing agent in water bath at 30°C
Be advised that the material may contain visible particles. These particles do not originate from the production process but are intrinsic to one recycled component, used to answer the market needs for cost reduction and increased sustainability.

MIXING RATIO

	BPR135G3-Neo : BPH
Parts by weight	100 : 40 ± 2
Parts by volume	100 : 47 ± 2

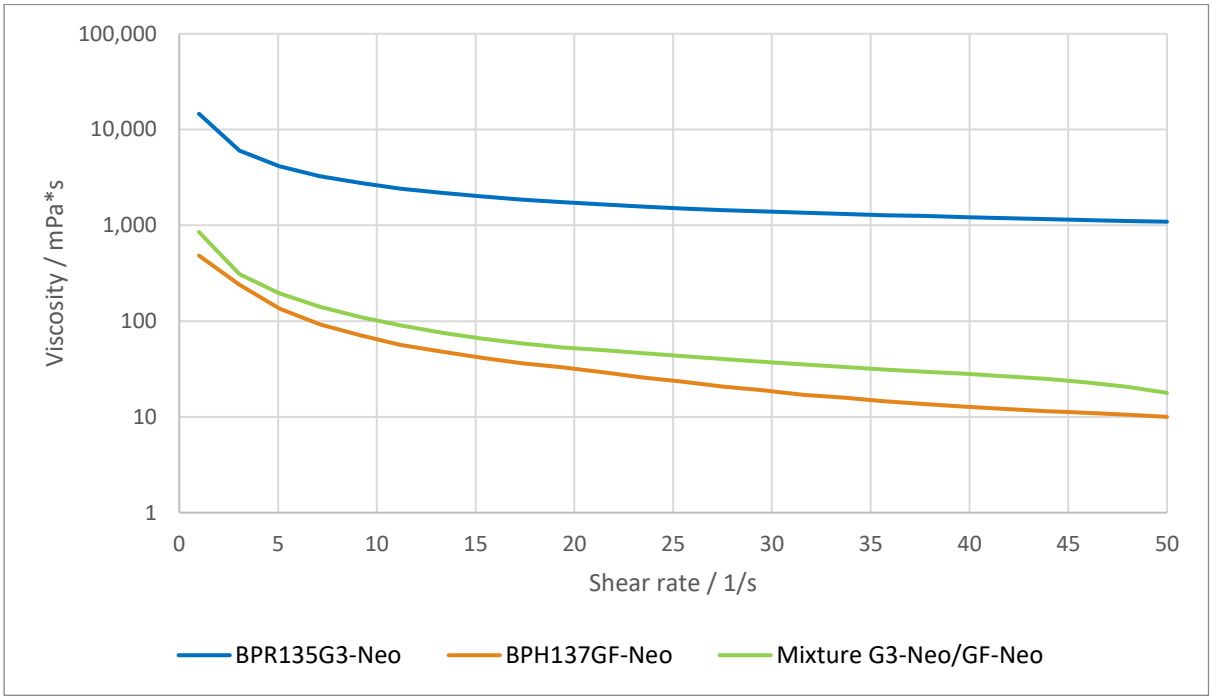
The mixing ratio stated must be observed very carefully. Adding more or less curing agent will not result in a faster or slower reaction, but in incomplete curing which can't be corrected in any way. Resin and curing agent must be mixed very thoroughly. Pay special attention to the walls and bottom of the mixing container.

TEMPERATURE DEVELOPMENT



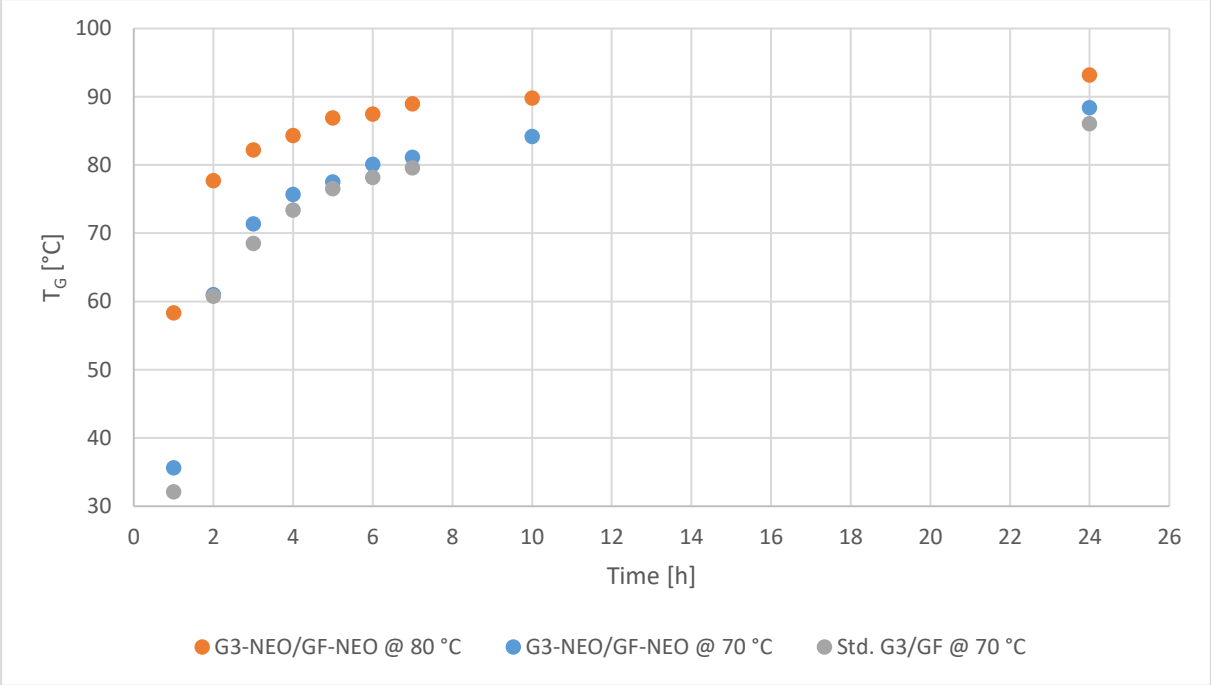
Measuring conditions:
measured 100g in a paper cup with a lid isolated in a water bath at 30°C; starting at 30°C

Viscosity



Measuring conditions:
Rotational viscometer, variable shear rate, 23°C, plate diameter 25 mm, measuring gap 0,5 mm

T_G DEVELOPMENT



Curing agent BPH137GF-Neo
Measuring conditions:
DSC-measuring heat rate: 20°C/min, sample mass 10-20 mg

TYPICAL MECHANICAL DATA

Typical mechanical data (both curing agents)			
Single lap shear test DIN EN ISO 1465 Test at standard climate	**Bond line [mm]**	0.5	3.0
	Lap Shear Strength[1] [MPa]	> 25	> 16
Peel strength DIN EN ISO 11339	> 2 N/mm		
Tensile test DIN EN ISO 527-2	**Tensile strength [MPa]**	≈ 66	
	Tensile modulus [GPa]	≈ 3.8 … 4.5	
	Tensile strain at break[2] [%]	≈ 4	

1) Lap shear Strength strongly depends on specimen configuration, especially laminate thickness

2) Tensile strain at break results strongly depend on specimen quality, especially void content