

EPIKOTE™ Resin MGS® RIMR135

EPIKURE™ Curing Agent MGS® RIMH134, RIMH1366, RIMH137, RIMH138

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Approval	German Lloyd
Application	Rotor blades for wind turbines, boat and ship building, sports and recreation equipment, tooling and other devices
Operational temperature	-60 °C up to +80 °C after heat treatment
Processing	At temperatures between 15 °C and 50 °C
Features	Pot life from approx. 0,5h to 7 h Good mechanical and fatigue properties
Storage	Shelf life of 24 months in originally sealed containers

Characteristics

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EPIKOTE™ Resin MGS® RIMR135

EPIKOTE™ Resin MGS® RIMR 135 is a low-viscous infusion resin system approved by German Lloyd and can be used for processing of glass, carbon and aramide fibers. Due to its excellent mechanical properties, this system is suitable for the production of components featuring high static and dynamic loadability.

Application

The range of pot lives at room temperature is between approx. 0,5 and approx. 7 hours. Curing at higher temperatures (up to approx. 80-100°C) is possible, depending on layer thickness and geometry of the parts to be manufactured.

The optimum processing temperature is in the range of 20 to 35°C. Higher temperatures are possible, but will shorten pot life. A temperature increase of 10°C will approx. halve the pot life. Different temperatures during processing are not known to have significant impact on the mechanical properties of the cured product. Water (e.g. high humidity or contained in the fabrics) can cause an acceleration of the resin/curing agent reaction and influence mechanical properties.

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.

The infusion resin system does not contain any unreactive components. The raw materials used feature a very low vapour pressure permitting to process the material under vacuum even at elevated temperatures. For processing at elevated temperatures lower reactive curing agents like RIMH137 and especially RIMH138 are available in order to keep peak temperatures during curing at moderate or very low level.

Compatibility problems are not to be expected in combination with UP gelcoats, coatings (e.g. PUR-based), etc. However, comprehensive tests are indispensable.

Epoxy resins are super cooled liquids, therefore crystallisation is immanently possible. In an early stage, crystallisation is visible as a clouding, and can progress to a stage, where the resin becomes a wax- like solid. Crystallisation can be reversed by slow heating of the product to approx. 40 - 60 °C, stirring or shaking will clarify the contents of the container without any loss of quality. Use only completely transparent products. Before warming up, open containers slightly to permit equalization of pressure. Caution during warm-up! Do not warm up over an open flame! While stirring up use safety equipment (e.g. gloves, eyeglasses, long sleeves and trousers, respirator equipment).

After dispensing material, the containers must again be closed carefully, to avoid contamination or absorption of water. All amine hardeners show a chemical reaction when exposed to air, known as „blushing“. This reaction is visible as white carbamide crystals, which could make the materials unusable.

The materials have a shelf life of minimum 2 years, when stored in their originally sealed containers.

The relevant industrial safety regulations for the handling of epoxy resins and curing agents as well as our instructions for safe processing are to be observed.

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**Specifications
(Typical)**

		Infusion resin RIMR135
Density ¹⁾	[g/cm ³]	1,11 – 1,15
Viscosity ¹⁾	[mPa·s]	800 – 1100
Refractory index ¹⁾		1,5475 – 1,5515

		Curing agent	
		RIMH134	RIMH1366
Density ¹⁾	[g/cm ³]	0,93 – 1,00	0,94 – 0,96
Viscosity ¹⁾	[mPa·s]	10 – 80	5 – 30
Refractory index ¹⁾		1,487 – 1,495	1,462 – 1,471
Potlife ²⁾	[min]	Approx. 45	Approx. 110
T _{G pot (midpoint)}	[°C]	Approx. 90°C unconditioned	

		Curing agent	
		RIMH137	RIMH138
Density ¹⁾	[g/cm ³]	0,92 – 0,95	0,92 – 0,94
Viscosity ¹⁾	[mPa·s]	10 – 50	5 – 20
Refractory index ¹⁾		1,458 – 1,464	1,459 – 1,465
Potlife ²⁾	[min]	Approx. 240	Approx. 350
T _{G pot (midpoint)}	[°C]	Approx. 90°C unconditioned	

Measuring conditions: 1) measured at 25°C
2) measured in 30°C water bath

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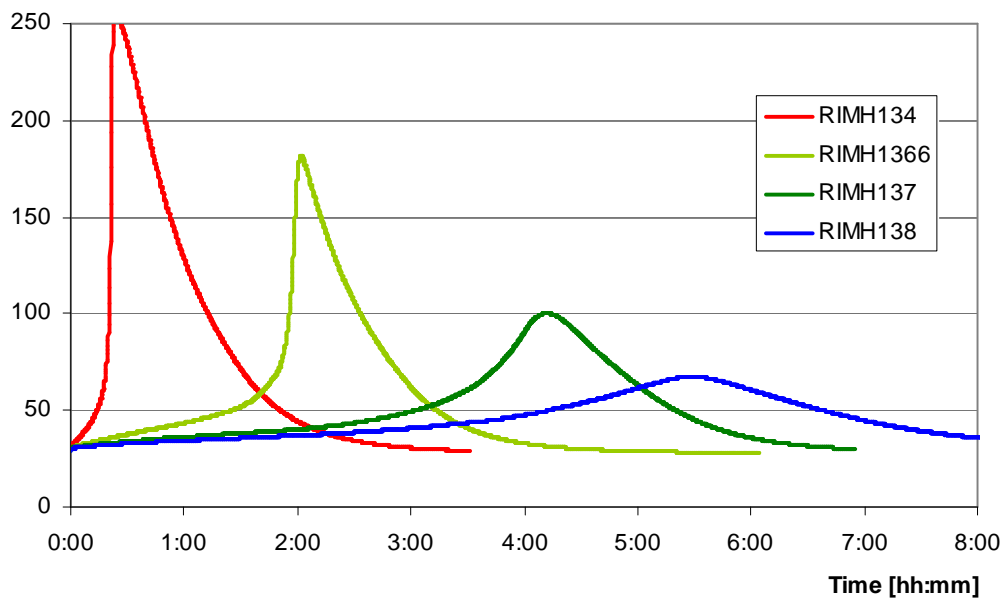
	RIMR135 : All curing agents
Parts by weight	100 : 30 ± 2
Parts by volume	100 : 36 ± 2

Mixing ratio

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 cannot be corrected in any way. Resin and curing agent must be mixed very thoroughly. Mix until no clouding is visible in the mixing container. Pay special attention to the walls and bottom of the mixing container.

Some curing agents are coloured for easier identification of a correct mixing process. Although unlikely, deviations in colour are possible (e.g. due to UV radiation after longer exposure to sun light), but are not known to have an effect on the processing and final properties of the material.

Temperature [°C]



Temperature development

Measuring conditions: 100g sample in a paper cup / water bath at 30°C

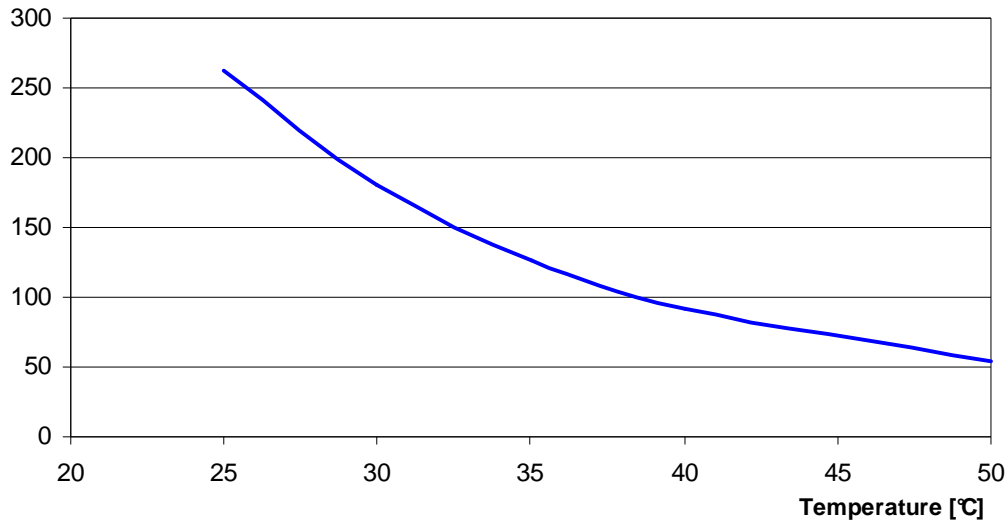
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Viscosity [mPa*s]

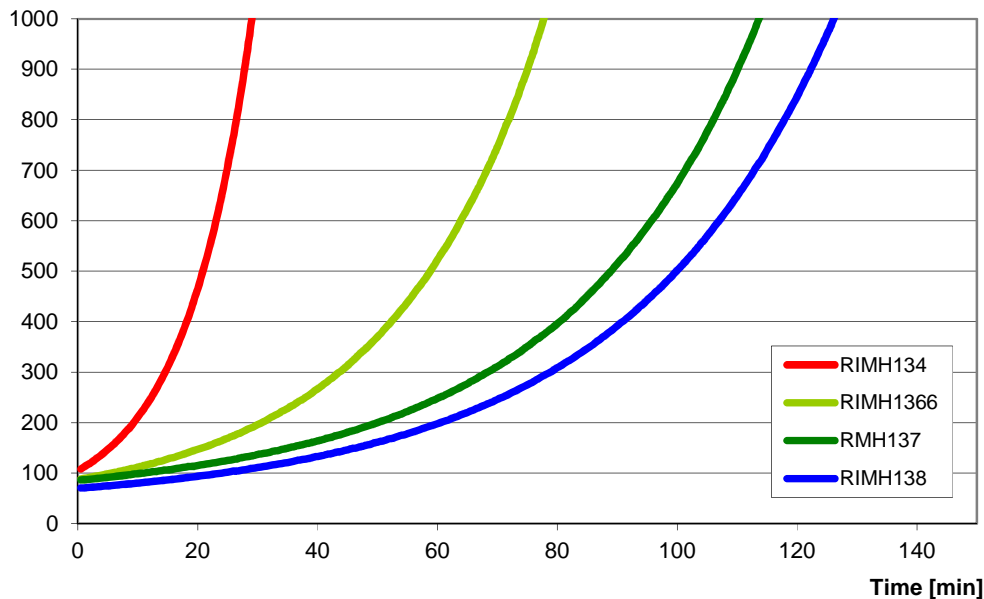


Viscosity of mixture

Measuring conditions:

rotation viscosimeter, plate-plate configuration, measuring gap 0.2 mm

Viscosity [mPa*s]



Viscosity development

Measuring conditions:

rotation viscosimeter, plate-plate configuration, measuring gap 0.2 mm, temperature 40°C

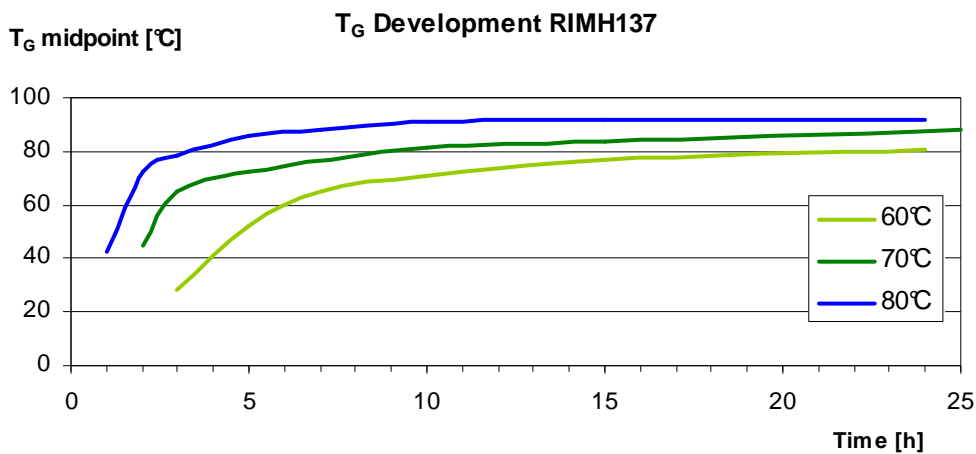
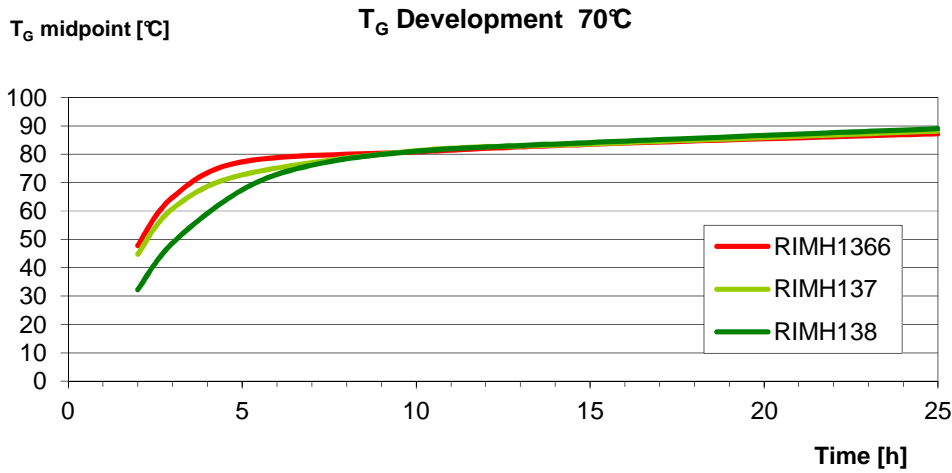
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T_G development



Measuring conditions for all T_G measurements: DSC, DIN EN ISO 11357

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Mechanical data		
Density DIN EN ISO 1183-1	[g/cm ³]	Approx. 1,15
Flexural strength DIN EN ISO 178	[MPa]	90 – 110
Modulus of elasticity DIN EN ISO 178	[GPa]	2,7 – 3,2
Tensile strength DIN EN ISO 527-2	[MPa]	Approx. 70
Elongation at break DIN EN ISO 527-2	[%]	8 – 12
Water absorption at 23°C DIN EN ISO 175	24h [%] 7d [%]	0,10 – 0,20 0,20 – 0,50
Curing: 8h 70°C		

**Mechanical data
of neat resin**

Advice:

Mechanical data are typical for the combination of laminating resin RIMR135 with curing agent RIMH137. Data can differ in other applications.

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