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VE140

FUEL RESISTANT VINYLESTER RESIN

Key Features

- Highly fuel and chemical resistant
- Service temperature up to 140°C
- Excellent mechanical properties
- Suitable for most processes
- Can be used as a sealer/coating*

Product Description

VE140 is a high-performance epoxy novalac vinylester resin system suitable for the construction and sealing/coating of composite fuel tanks. It is also suitable for non-fuel/chemical contact applications requiring superior mechanical properties or high temperature resistance, up to 140°C service temperature.

VE140 is low viscosity and offers fast wet-out glass, carbon fibre and a wide range of other reinforcements. It is recommended for hand laminating but can also be used filament winding, spray-up and resin infusion, subject to correct process parameters.

Suggested Uses

As well as fuel and chemical exposure applications, the mechanical performance and high service temperature of VE140 make it suitable for a wide range of uses:

- Composite fuel tank construction (carbon fibre, glass fibre, aramid fibre)
- Composite fuel tank coating or sealing (*fumed silica and solution MW recommended)Coating surfaces to offer fuel resistance.
- Chemical resistant fabrication/coating (solvents, acids, chlorine etc.)
- High temperature fibreglass/GRP applications (up to 140°C service temperature)

Properties

The table below shows the typical uncured properties:

Property	Units	Result
Material	-	Vinylester Resin
Appearance	-	Clear Liquid
Viscosity @20 °C	mPa.s.	208 – 282
Density @20 °C	g/cm³	1.08
Acid Value	mg KOH/g	6 - 13
Solids Content, IR	%	61.5 - 64.5
Peak Time	Minutes	26.4 - 35.7
Peak Temperature	°C	144 - 176
Flash Point	°C	33
Auto Ignition Temperature	°C	490
pH	-	7

How to Use

VE140 is a chemical product intended for professional use. Before storage or use, it is essential to read and follow the information provided in the safety datasheet.

Curing & Reactivity

Requires Cobalt Accelerator

VE140 is unaccelerated and requires cobalt accelerator to cure properly. 3% by weight of a 1% cobalt dilution, such as AC1 Cobalt Accelerator (1%), should be added to the resin immediately prior to use. Accurately measure the correct amount of accelerator and then mix into the uncatalyzed resin. Mix thoroughly to ensure the cobalt is fully dispersed into the resin before adding the catalyst.

Under no circumstances should MEKP catalyst be added directly to cobalt accelerator or poured on top of cobalt accelerator that has not yet been mixed into the resin. Doing so can cause a violent reaction.

When using a cobalt accelerator other than AC1, check the cobalt percentage of the accelerator. In case of higher concentrations of cobalt (for example 6% cobalt), adjust the amount of accelerator added accordingly.

Requires MEKP Catalyst

VE140 is cured using MEKP (methyl ethyl ketone peroxide) catalyst. The reactivity of the resin will be determined by both the percentage of cobalt accelerator, and the percentage of MEKP catalyst. For most applications, the addition of 2% (standard reactivity) MEKP is suggested.

Under no circumstances should MEKP catalyst be added directly to cobalt accelerator or poured on top of cobalt accelerator that has not yet been mixed into the resin. Doing so can cause a violent reaction.

Mix Ratio

Mix Ratio 3% AC1 Cobalt Accelerator by Weight and 2% MEKP Catalyst by Weight.

VE140 Fuel Resistant Vinylester Resin should be mixed with 3% AC1 Cobalt Accelerator by weight and its MEKP Catalyst at a ratio of 2% MEKP Catalyst, by weight.

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You must maintain the correct overall ratio of resin to Catalyst and accelerator to ensure a proper cure. Failure to do so will result in a poor or only partial cure of the resin, greatly reduced mechanical properties and possibly other adverse effects.

Mixing Instructions

Only weigh out and mix as much resin as you can use within the pot life.

Weigh or measure the exact correct ratio of resin and AC1 Cobalt Accelerator into a straight sided container. Using a suitable mixing stick begin to mix the componants together to combine them completely.

MEKP catalyst **MUST NOT** be added directly to cobalt accelerator or poured on top of cobalt accelerator that has not yet been mixed into the resin. Doing so can cause a violent reaction.

Once the AC1 has been thoroughly mixed with the resin, weight out the exact correct ratio of MEKP Catalyst into the mixture and using a suitable mixing stick begin to mix the componants together to combine them completely.

Mix thoroughly to ensure that the componants are well distributed throughout the resin before pouring.

Care should be taken to avoid aerating the resin whilst mixing. Use a steady mixing action, moving material from the bottom and edges of the containing into the middle.

Once you have finished mixing in one container, it is good practice to transfer the mixed resin into a second container and undertake further mixing of the resin using a new mixing stick. Doing so will eliminate the risk of accidentally using unmixed resin from the bottom or sides of the container.

Pot-Life / Working Time / Cure Time

Transfer the resin from the mixing pot onto the part as soon as possible to extend the working time and avoid the risk of uncontrollable rapid cure in the mixing pot.

As with all resin systems, the pot-life/working time will vary significantly depending on the ambient temperature, the starting temperature of the resin and catalyst and the amount of resin mixed.

	Pot Life @ 20 °C	Gelation @ 20 °C	Demould Time @ 20 °C
Time	22 mins	40-60 mins	24 hrs

Our VE140 Fuel Resistant Vinylester Resin can be used in ambient temperatures between 15°C (59°F) and 30°C (86°F). For best results, an ambient temperature of at least 20°C (68°F) is recommended. Ensure that both resin and hardener containers are within this temperature range before use.

Curing times will depend on the size and shape of the casting and also the ambient working temperature and so will vary between 12 and 24hrs to reach a full cure.

Elevated Temperature Post-Cure

Although VE140 can be cured at room temperature, an elevated temperature post-cure is required to reach full mechanical properties, temperature resistance and chemical resistance. For fuel tank sealing or construction, an elevated temperature post-cure should always be undertaken.

Higher temperature post-cure cycles will yield the highest service temperature and mechanical properties of the cured system, although they do require additional consideration in terms of maximum service temperatures of pattern, mould and component materials, and the potential for distortion during unsupported post-cures.

Gradual stepped increase of temperature over time takes longer but reduces the risk of distortion, particularly during unsupported post-cures.

	Unsupported (Free Standing)	Supported (In Mould)
Service temperatures up to 100°C	24hrs @ room temp. 1hr at 40°C 1hr at 50°C 1hr at 60°C 1hr at 70°C 1hr at 80°C 1hr at 90°C 2hrs at 100°C	24hrs @ room temp. 3hrs at 100°C
Service temperatures up to 140°C Maximum mechanical properties	Post-cure cycle above, followed by: 30mins at 110°C 30 mins at 120°C 30 mins at 140°C 1hr mins at 150°C	Post-cure cycle above, followed by: 1hr at 150°C

Use as a Barrier Coat or Sealer

Use as a Gelcoat (into a mould)

To act as a fuel or chemical resistant barrier coat, VE140 can be thickened using 3% (by weight) fumed silica to create a spray-gel consistency or 5% (by weight) fumed silica to create a brush-gel consistency. The resin will retain a light surface tack, suitable for backing up, for around 24hrs.

Use as a Flow Coat (applying to a surface)

When using VE140 as a fuel or chemical resistant coating to be applied into an existing component or surface, the resin should be thickened with 5% fumed silica to achieve a brush-gel consistency. One or more coats can be applied, waiting for previous coats to cure to the B-stage.

To achieve a tack-free finish, 2% Solution MW (wax additive) should be added to the final coat.

Mechanical Properties

Cured Resin Properties

These properties describe the resin only. The mechanical properties of a reinforced composite would be considerably different. Cured 24 hours 20 °C then 3 hours 100 °C and 1 hour at 150 °C.

	Units	Result
Tensile Strength	MPa	90
Tensile Modulus	GPa	3.5
Elongation at break	%	4.0
Flexural Strength	MPa	155
Flexural Modulus	GPa	3.6
Heat Distortion Temperature	°C	140
Glass Transition Temperature	°C	150
Impact Resistance	kJ/m^2	13
Water Absorption @ 23 °C	%	1.0
Water Absorption @ 100 °C	%	1.6
Hardness	Barcol	45

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Cured Laminate Properties

These properties describe a laminate consisting of resin and 4 plies of Glass Mat OCF M710, Vetrotex M113. Cured 24 hours 20 °C then 3 hours 100 °C and 1 hour at 150 °C.

	Units	Result
Glass Content	%	34.0
Tensile Strength	MPa	111
Tensile Modulus	GPa	10.1
Flexural strength	MPa	208
Flexural Modulus	GPa	9.8
Impact Resistance	kJ/m^2	115
Linear Expansion Between	K^{-1}	$30x10^{-6}$
Thermal Conductivity	W/m.K	0.19

Transport and Storage

Resin and hardener should be kept in tightly seal containers during transport and storage. Both the resin and hardener should be stored in ambient conditions of between 5°C (50°F) and 30°C (77°F).

When stored correctly, the resin and hardener will have a shelf-life of 6 months. Although it may be possible to use the resin after a longer period, a deterioration in the performance of the resin will occur, especially in relation to clarity and cure profile.

Pay particular attention to ensuring that containers are kept tightly sealed. Epoxy hardeners especially will deteriorate quickly when exposed to air.

Disclaimer

This data is not to be used for specifications. Values listed are for typical properties and should not be considered minimum or maximum.

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