EPOXY INFUSION RESIN

IN2

Key Features

- Ideal For Resin Infusion
- Ultra Low Viscosity Resin
- Outstanding Wetting Abilities
- Good Mechanical Properties
- Choice of Hardener Speed

Product Description

Our IN2 is a high performance epoxy resin that has been specifically formulated for use in resin infusion composites production.

As an infusion resin it is ultra-low viscosity ensuring that is able to quickly infuse through a range of reinforcements. Its excellent mechanical strength makes it ideally suited for use with high performance reinforcements such as carbon fibre and aramids like Kevlar.

The resin also exhibits excellent cured mechanical properies far in excess of many more traditional epoxy resin brands (as can be seen from the technical data sheets). Improved mechanical properties mean stronger, ligher, higher performance parts.

Recommended Uses

This is a high performance low viscosity epoxy resin formulated specifically for use in resin infusion composites production. The resin cures to a clear finish.

This is the same epoxy infusion resin that is included with our Resin Infusion Complete Starter Kit.

When cured the epoxy exhibits good flexural strength making it will suited to the lamination of structural parts. The resin also exhibits very good clarity making it also suitable for use when laminating unpainted carbon fibre composites.

Properties

The table below shows the typical uncured properties:

Property	Units	Resin	Hardener	Combined
Material	-	Epoxy Resin	Formulated Amine	Epoxy
Appearance	-	Clear Liquid	Amber Liquid	Clear Liquid
Viscosity @20 °C	mPa.s.	500 – 800	10 - 20	200 – 450
Density @20 °C	g/cm^3	1.08 – 1.18	1.07 – 1.13	1.12 – 1.18

How to Use

IN2 is a chemical product for professional use. It is essential to read and understand the safety and technical information before use.

Follow the guidelines for safe use outlined in the SDS which include the use of appropriate hand and eye protection during mixing and use.

Mix Ratio

Mix Ratio 100:30 by Weight

IN2 Epoxy Laminating Resin should be mixed with AT30 FAST or AT30 SLOW hardener at a ratio of 100 parts of resin to 30 part sof hardener, by weight. FAST and SLOW hardeners can be blended to achieve pot-life and demould times anywhere between those stated. However, you must still maintain the correct overall ratio of resin to hardener 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. Under no circumstances add 'extra hardener' in an attempt to speed up the cure time; epoxies do not work in this way.

Our IN2 Infusion Resin is available with a choice of two hardener speeds; 'FAST' which has a pot-life of 9-14mins and 'SLOW' which provides a pot-life of 80-100mins. As standard we recommend using IN2 Infusion Resin with the SLOW hardener, especially for larger infusion projects. For small projects where you are confident of the infusion time, use of the FAST hardener greatly reduces the demould time.

Mixing Instructions

IN2 is a highly reactive (fast curing) resin system. 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 hardener into a straight sided container. Using a suitable mixing stick begin to mix the resin and hardener together to combine them completely.

Spend at least one minute mixing the resin and hardener together, paying particular attention to the sides and base of the container. Remember: Any resin that has not been thoroughly combined with hardener will not cure.

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

IN2 is a highly reactive resin system and once the resin has been mixed with the hardener, the reaction will start to give off heat (exotherm) which will further accelerate the cure of the resin, especially when the resin is in the mixing pot.

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 epoxies, the pot-life/working time will vary significantly depending on the ambient temperature, the starting temperature of the resin and hardener and the amount of resin mixed.

The table below gives an indication of pot-life and cure times:

	Pot-Life @ 25 °C	Gelation @ 25 °C	Demould Time @ 25 °C
AT30 SLOW*	120 - 150mins	8 - 10hrs	18 - 24hrs
AT30 FAST*	10 - 14mins	2 - 4hrs	6 - 8hrs

*Fast and slow hardeners can be blended to achieve pot-life and demould timesanywhere between those stated above.

	25 °C	60 °C	100 °C	Full Cure at 25°C
Cure Time	24hrs	6hrs	3hrs	7 Days

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Full Cure / Post-Cure

As with most epoxy systems, where parts cure in normal ambient temperatures, full cure is not reached for several days. Although parts will be handleable after the listed demould time (at 25°C), full mechanical properties will take at least 14 days to develop in (at 25°C). Where possible, avoid exposing the cured resin to full service rigours for at least this time.

As with many post-cure cycles for resins, the post-cure cycle for our IN2 Epoxy Resin is not too sensitive and a range of different post-cure cycles will produce good results, specifically improved mechanical performance and elevated HDT/operating temperature. Post-curing parts that will be used at or exposed to elevated operating temperatures (such as vehicle bonnets/hoods in direct sunlight, engine-bay parts, car interior parts etc.) is strongly recommended to prevent distortion of the parts when they are put into service and experience these higher temperatures.

Where possible, parts should be post-cured still inside the mould to reduce distortion and improve surface finish (i.e. reduce 'print-through'). When post-curing parts in the mould, it is important to post-cure them without demoulding at all (i.e. don't demould and then put them back into the mould) otherwise you can get some strange patterns on the surface where some areas are post cured in direct contact with the mould surface and others are not.

A simple and very effective post-cure cycle with the IN2 Epoxy Infusion Resin is as follows:

CYCLE #1 SUITABLE FOR MOST SITUATIONS

- 24hrs at room temperature
- 6hrs at 60°C

If you're encountering any surface finish issues (faint print-through) then you can experiment with a slower 'ramp rate' which sometimes improves things:

CYCLE #2 SUGGESTED FOR SUBTLE IMPROVEMENTS TO SURFACE FINISH

- 24hrs at room temperature
- 2hrs at 40°C
- 2hrs at 50°C
- 5hrs at 60°C

If you need to push the HDT of the finished part higher then you could increase post-cure up to a maximum of 80°C as follows:

CYCLE #3 SUGGESTED FOR HIGHEST POSSIBLE HDT/ OPERATING TEMPERATURE

- 24hrs at room temperature
- 2hrs at 40°C
- 2hrs at 50°C
- 2hrs at 60°C
- 2hrs at 70°C
- 4hrs at 80°C

These are all just suggestions. Most situations just call for option #1; 6hrs at 60°C. Many customers also find that they can dispense with the 24hrs cure at ambient and simply load newly infused parts into the oven to begin the cure however this is something that you would need to experiment with yourself. A cure at ambient temperature before post-cure is generally favoured with most resin systems.

Mechanical Properties

Cured Resin Properties

	Units	AT30 SLOW	AT30 FAST
Colour		Pale yellow	Pale yellow
Machinability		Excellent	Excellent
Density 25°C	g/ml	1.08 – 1.12	1.08 – 1.12
Hardness 25°C	Shore D/15	84 – 88	84 – 88
Maximum Tg	°C	92 – 98	82 – 88
Water absorption (24h RT)	%	0.10 – 0.20	0.20 – 0.30
Water absorption (2hr 100°C)	%	0.60 – 0.70	0.90 – 1.00
Flexural strength	MN/m^2	110 – 120	107 – 120
Compressive Strength	MN/m^2	88 - 100	94 - 100
Maximum strain	%	5 – 7	5 – 7
Strain at break	%	6 – 8	7 – 12
Flexural modulus	MN/m^2	3100 – 3500	2800 – 3200
Tensile strength	MN/m^2	68.5 – 76	74.0 – 80.0
Elongation at break	%	6 – 8	6.5 – 9.5

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 10°C (50°F) and 25°C (77°F).

When stored correctly, the resin and hardener will have a shelf-life of 12 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

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