Fairpoxy High Renewable Carbon Content Systems for the Production of Fibre Reinforced Composites

Description

Fairpoxy Laminating System has a high renewable (bio) carbon content which is suitable for the production of environmentally friendly fibre reinforced laminates. The systems are suitable for coatings, wet lay-up and various types of injection moulding. The system is designed to cure at ambient temperature, but heat can also be used to accelerate cure rate, increase production efficiency and reach optimal final properties.

The high renewable content system is certified under the United States Department of Agriculture's (USDA's) BioPreferred® program and carry the USDA BioPreferred® label.

Details of the scheme can be found at www.biopreferred.gov. The certified biocarbon content of the system is 29% as indicated on the label above. Fairpoxy is a low viscosity epoxy and should be mixed at the recommended dose rate of 2:1 by volume or 100 parts resin to 45 parts hardener by weight, in order to meet the requirements of the USDA certification. The initial mixed viscosity of the systems is low at around 360 mPa.s.

The Fairpoxy Laminating System is suitable for use with all common reinforcing fibres such as glass, flax, carbon and basalt. An important feature of the system is the presence of two distinct Tgs, the system cures to an interpenetrating network (IPN) containing two separate domains with different Tg. This is an attractive property for composite materials which will have desirable properties from the two domains, a combination of high Tg and toughness. The system is fast curing at room temperature and a post cure of 1 hour at 120°C is possible. Care should be taken to avoid an excessive cure exotherm especially with large volumes.

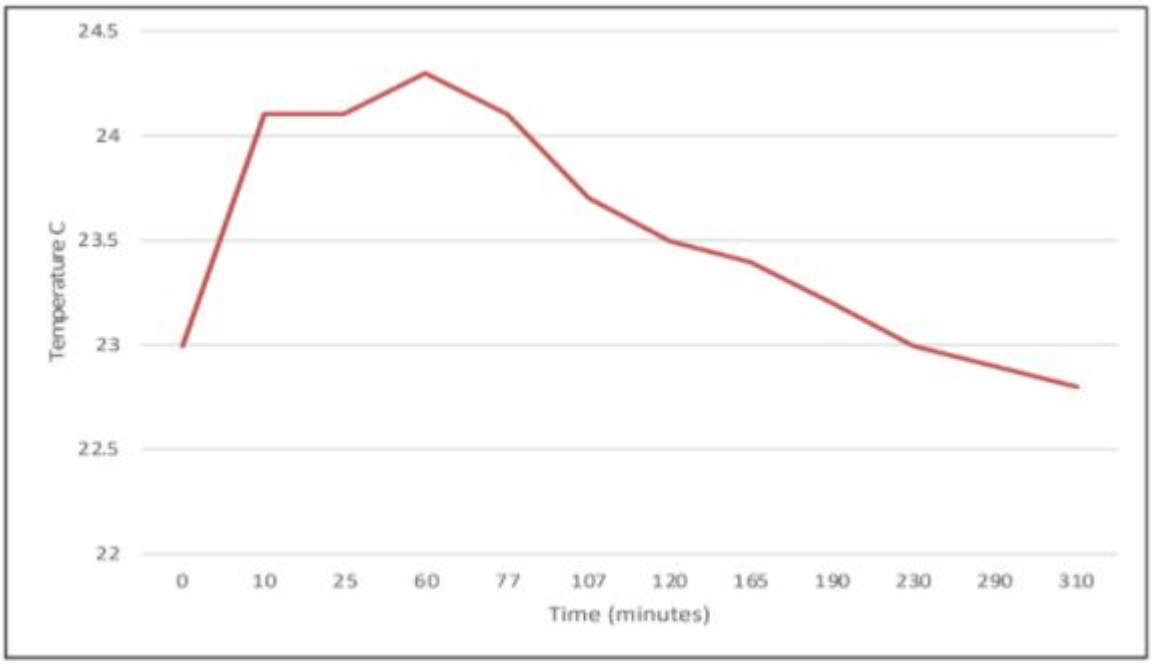
System characteristics

Resin	: Fairpoxy Laminating Resin - A
Hardener	: Fairpoxy Laminating Hardener - B
Resin : Hardener mix ratio	: 2:1 by volume or 100:45 by weight

Initial mixed viscosity (23°C)	: 360 mPa.s
Gel time[a] @23°C	: 110 minutes
Cure time[a] @23°C	: 340 minutes
Tg, ambient cure	: 55°C
Tg after 1h post-cure @120°C	: 89 and 132°C (2 Tgs visible)
E-Modulus (100% binder)	: 2.6 GPa

[a]20 g mass

Graph showing exotherm development in a 20 g mass at 23°C:



Dynamic Mechanical Analysis (DMA) graph for at stoichiometric mixing ratio, first and second run. The second graph clearly shows the presence of two distinct domains in the material with different glass transition temperature (Tg).