

Evopreg® PFC502 is a fire-retardant prepreg with a low environmental impact based on a PFA (Polyfurfuryl Alcohol) bioresin. PFA is a thermosetting bioresin derived from crop waste and is similar to phenolic resin but with lower toxicity and VOC emissions. In addition to its environmental credentials, PFA has outstanding fire retardant properties, plus excellent temperature and chemical resistance.

The prepreg can be supplied with a range of reinforcement fibres and fabric constructions, including woven and unidirectional E-glass fibre and carbon fibre. Consolidation can be done by vacuum bagging, autoclave or press moulding. Applications include aircraft interiors, rail interiors, marine, offshore, and construction.

## KEY FEATURES & BENEFITS

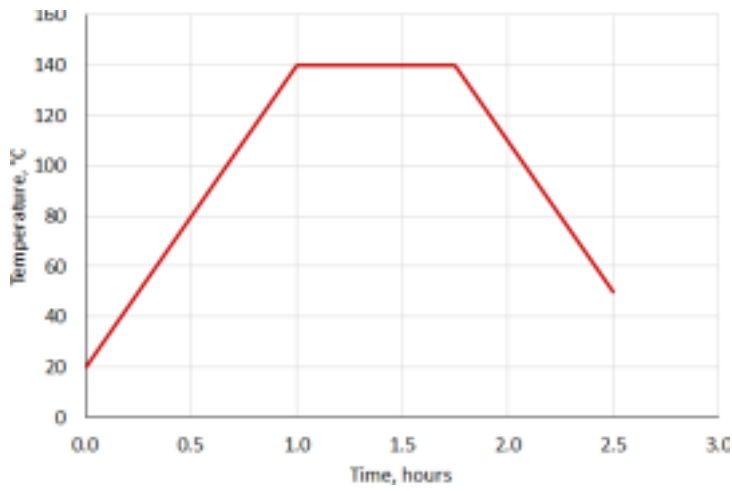
- Outstanding FST performance - FAR/CS 25.853 (aero) and EN 45545-2 HL3 (rail)
- Low toxicity and low VOC emissions
- Flexible cure temperature 130-160°C
- Suitable for vacuum bag/oven, autoclave and press moulding
- Service temperature up to 200°C
- Available on a wide range of reinforcement fabrics

## CURE PROFILES

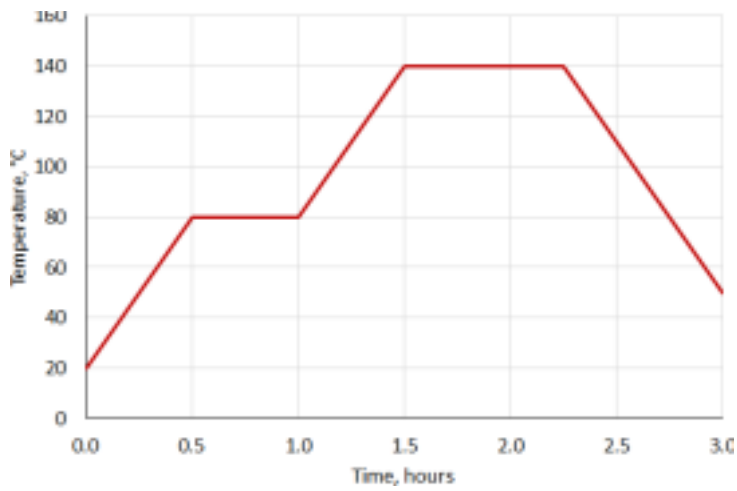
Initial Cure Temperature / °C	Dwell Time
130	100 min
140	45 min
150	25 min
160	10 min

- The prepreg can be processed using standard techniques including vacuum bag/oven, autoclave and press moulding
- Recommended ramp rate 1-3°C/min
- Recommended pressure 3.5 bar (50 psi)
- Cure times may need to be extended to account for thermal lag in large tools

Suggested cure cycle for standard cures at 140°C:

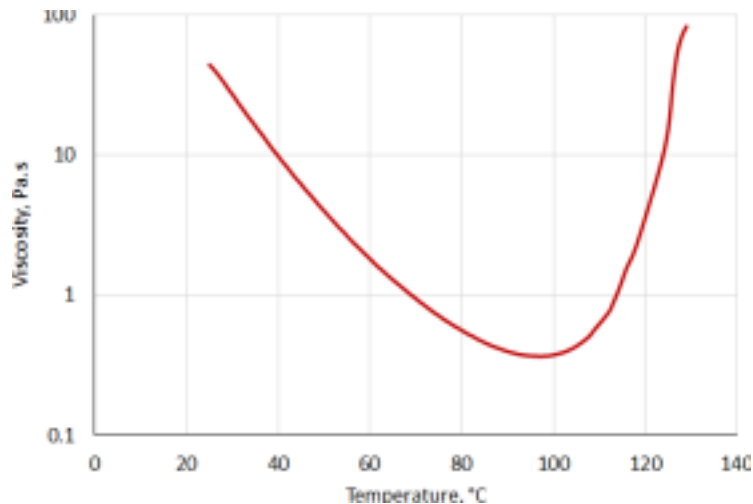


Alternative cure cycle to optimise surface finish for cures at 140°C:



## Viscosity Profile

Plate-on-plate, ambient temperature 25°C, shear rate 20 s<sup>-1</sup>, ramp rate 2°C/min:



## Tooling and Vacuum Bagging Materials

PFC502 prepreg releases a small amount of water during cure (polycondensation reaction). It is recommended to use well-sealed and released epoxy composite or stainless steel tooling. Aluminium and carbon steel tools are not recommended, unless coated with PTFE or other impermeable release layer, because the water and pH level can cause corrosion. When curing in a vacuum bag, it is recommended to use perforated release film and heavyweight breather cloth. For thick laminates, it is recommended to use peel ply and heavyweight breather cloth. It is advisable to use a water/condensation trap to protect vacuum pumps. When press moulding, it may be necessary to take steps to allow the water/steam to escape during the process.

## Mechanical Properties of Monolithic Laminates

### Glass

Typical data for laminates made from woven glass-reinforced PFA prepreg (Evopreg® PFC502-G300S-7781-40-1270) cured in an autoclave for 1 hour at 140°C.

Property	Result	Test method
Fibre content by volume, Vf	43%	Internal method
Cured ply thickness	0.26 mm/ply	Internal method
Density	1.84 g/cm <sup>3</sup>	ISO 1183
Flexural strength, 0°	495 MPa	ISO 178
Flexural strength, 90°	395 MPa	ISO 178
Flexural modulus, 0°	21.8 GPa	ISO 178
Flexural modulus, 90°	18.9 GPa	ISO 178
Tensile strength, 0°	304 MPa	ISO 527-4
Tensile strength, 90°	253 MPa	ISO 527-4
Tensile modulus, 0°	21.9 GPa	ISO 527-4
Tensile modulus, 90°	21.1 GPa	ISO 527-4
Compressive strength, 0°	343 MPa	ASTM D3410
Compressive modulus, 0°	22.6 GPa	ASTM D3410
Apparent interlaminar shear strength (ILSS), 0°	41.1 MPa	ISO 14130
In-plane shear strength	85 MPa	ISO 14129
In-plane shear modulus	5.2 GPa	ISO 14129

Typical data for laminates made from woven glass-reinforced PFA prepreg (Evopreg® PFC502-G870T-35-1250) cured in an autoclave at 3.5 bar for 1 hour at 140°C.

Property	Result	Test method
Fibre content by volume, Vf	54%	Internal method
Cured ply thickness	0.64 mm/ply	Internal method
Density	1.93 g/cm <sup>3</sup>	Internal method
Flexural strength, 0°	416 MPa	ISO 14125
Flexural strength, 90°	433 MPa	ISO 14125
Flexural modulus, 0°	20.0 GPa	ISO 14125
Flexural modulus, 90°	21.2 GPa	ISO 14125
Tensile strength, 0°	268 MPa	ISO 527-4
Tensile strength, 90°	246 MPa	ISO 527-4
Tensile modulus, 0°	22.0 GPa	ISO 527-4
Tensile modulus, 90°	22.9 GPa	ISO 527-4
Compressive strength, 0°	158 MPa	ASTM D6641
Compressive strength, 90°	165 MPa	ASTM D6641
Apparent interlaminar shear strength (ILSS), 0°	21.8 MPa	ASTM D2344, failure mode unclear
In-plane shear strength	32.7 MPa	ISO 14129, 8 plies

## Carbon

Typical data for laminates made from woven carbon-reinforced PFA prepreg (Evopreg® PFC502-C245T-HS-3K-42-1250) cured in an autoclave at 3.5 bar for 1 hour at 140°C.

Property	Result	Test method
Fibre content by volume, Vf	50%	Internal method
Cured ply thickness	0.28 mm/ply	Internal method
Density	1.47 g/cm <sup>3</sup>	Internal method
Flexural strength, 0°	629 MPa	ISO 14125
Flexural strength, 90°	727 MPa	ISO 14125
Flexural modulus, 0°	49.6 GPa	ISO 14125
Flexural modulus, 90°	45.9 GPa	ISO 14125
Tensile strength, 0°	526 MPa	ISO 527-4
Tensile strength, 90°	619 MPa	ISO 527-4
Tensile modulus, 0°	62.6 GPa	ISO 527-4
Tensile modulus, 90°	55.8 GPa	ISO 527-4
Compressive strength, 0°	294 MPa	ASTM D6641
Compressive strength, 90°	370 MPa	ASTM D6641
Apparent interlaminar shear strength (ILSS), 0°	32.2 MPa	ASTM D2344
In-plane shear strength	61.7 MPa	ISO 14129

Typical data for laminates made from woven carbon-reinforced PFA prepreg (Evopreg® PFC502-C650T-HS-12K-38-1250) cured in an autoclave for 1 hour at 140°C.

Property	Result	Test method
Fibre content by volume, Vf	55%	Internal method
Cured ply thickness	0.65 mm/ply	Internal method
Density	1.57 g/cm <sup>3</sup>	ISO 1183
Flexural strength	454 MPa	ISO 178
Flexural modulus	46.5 GPa	ISO 178
Tensile strength	761 MPa	ISO 527-4
Tensile modulus	61.0 GPa	ISO 527-4
Compressive strength	236 MPa	ASTM D3410
Compressive modulus	56 GPa	ASTM D3410
Apparent interlaminar shear strength (ILSS)	33.9 MPa	ISO 14130
In-plane shear strength	92 MPa	ISO 14129
In-plane shear chord modulus	6.44 GPa	ISO 14129

## Mechanical Properties of Sandwich Panels

Data for sandwich panels with woven glass-reinforced PFA prepreg skins (Evopreg® PFC502-G300S-7781-40, 2 layers, 0.5 mm thick) and Nomex honeycomb core (48 kg/m<sup>3</sup>, 3.2 mm cell, 9.4 mm thick) cured in an autoclave for 1 hour at 140°C. Upperside of fabric (weft face) facing the honeycomb; warp direction of fabric to L-direction of honeycomb.

Property	Result	Test method
Climbing drum peel strength	103 N/75mm	EN 2243-3
Long beam flexural strength	1003 N	SAE 8-266N SAE-AMS-STD-401



## Fire, Smoke & Toxicity Properties

Aircraft Interiors - FAR/CS 25.853 Glass

Typical data for laminates made from woven glass-reinforced PFA prepreg (Evopreg® PFC502-G300S 7781-40, 2 layers, 0.5 mm thick) cured in an autoclave for 1 hour at 140°C.

Property		Test method	Units	Result
Flammability vertical 60 s flaming	Burn length	AITM 2.0002A / FAR/CS 25.853 App.F Pt.I	mm	31
	After flame time		s	<1
	After flame time of drips		s	0 (no drips)
Max. specific optical smoke density within 4 min, flaming mode		AITM 2.0007A / FAR/CS 25.853 App.F Pt.V	-	3
Max. concentration of smoke gas components, flaming mode	HCN	AITM 3.0005 / ABD0031 Iss.F	ppm	0.5
	CO			89
	NO/NO <sub>2</sub>			5.6
	SO <sub>2</sub> /H <sub>2</sub> S			0
	HF			0
	HCl			0
Heat release rate - max. within 5 min (HRR)		AITM 2.0006 / FAR/CS 25.853 App.F Pt.IV	kW/m <sup>2</sup>	28.3
Heat release - within 2 min (HR)			kW.min/m <sup>2</sup>	9.7

## Train Interiors - EN 45545-2 Glass

Data for laminates made from woven glass-reinforced PFA prepreg (Evopreg® PFC502-G300S-7781-40, 8 layers, 2 mm thick) cured in an autoclave for 1 hour at 140°C.

Requirement set	Test method reference	Parameter	Units	Result average	Class
R1	T02 ISO 5658-2	CFE	kW/m <sup>2</sup>	45.93	HL3
R1, R6	T03.01 ISO 5660-1, 50 kW/m <sup>2</sup>	MARHE	kW/m <sup>2</sup>	32.46	HL3
R1, R6	T10.01 EN ISO 5659-2, 50 kW/m <sup>2</sup>	D <sub>s4</sub>	-	22.88	HL3
R1, R6	T10.02 EN ISO 5659-2, 50 kW/m <sup>2</sup>	VOF4	min	80.46	HL3
R1, R6	T11.01 EN ISO 5659-2, 50 kW/m <sup>2</sup>	CIT <sub>G</sub> (4 min)	-	0.1536	HL3
		CIT <sub>G</sub> (8 min)	-	0.2555	HL3

## Carbon

Data for laminates made woven carbon fibre-reinforced PFA prepreg (Evopreg® PFC502-C650T-HS-12K-38-1250, 5 layers, 3 mm thick) cured in an autoclave for 1 hour at 140°C.

Requirement set	Test method reference	Parameter	Units	Result average	Class
R1	T02 ISO 5658-2	CFE	kW/m <sup>2</sup>	32.3	HL3
R1, R6	T03.01 ISO 5660-1, 50 kW/m <sup>2</sup>	MARHE	kW/m <sup>2</sup>	43.57	HL3
R1, R6	T10.01 EN ISO 5659-2, 50 kW/m <sup>2</sup>	D <sub>s</sub> 4	-	79.07	HL3
R1, R6	T10.02 EN ISO 5659-2, 50 kW/m <sup>2</sup>	VOF4	min	150.76	HL3
R1, R6	T11.01 EN ISO 5659-2, 50 kW/m <sup>2</sup>	CIT <sub>e</sub> (4 min)	-	0.0874	HL3
		CIT <sub>e</sub> (8 min)	-	0.1771	HL3

## STORAGE & OUTLIFE

- Outlife at 18°C is 14 days
- Storage life at -18°C is 6 months
- To store material, keep it frozen at -18°C in a polythene bag.
- Material must remain in the unopened bag until fully thawed.
- If all material is not used, then reseal in a polythene bag to prevent moisture absorption.
- To protect the material, we recommend storing it in its original box with the end supports.

## HEALTH & SAFETY

Please refer to the Safety Data Sheet (SDS) before use. This material contains resin and fibres which can cause irritation to skin and eyes, and allergic reactions. Wear appropriate PPE including impervious gloves and ensure adequate ventilation. Exothermic reactions can occur when curing resins, and particular care must be taken when curing thick laminates.

All data and guidance on this datasheet is provided based on typical processing and testing completed by Simcas Composites. Users should conduct their own testing and processing trials to ensure that this material is suitable for their specific process and application.