Unit 4
The Reservation
Sleaford Enterprise Park
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PS200

Highly Flame Retardant Prepreg

Introduction

PS200 is a highly flame-retardant bio-derived prepreg resin system designed for use in heat and flame shielding applications. Typically used in non-structural or semi-structural components, the properties of PS200 can be tailored to provide unique service performance characteristics across a wide range of temperatures. It can be supplied on a variety of reinforcement types and the resin system colour is dark brown / black.

Typical applications: Heat shielding and fire containment components and enclosures

Key Features & Benefits

- Initial cure temperature from **100°C**
- Long term service temperature up to **250°C**, **depending on applications**
- 15-minute abuse temperature resistance up to **1200°C**
- Work life at 20°C: **21 days**
- Storage life at -18°C: **12 months**
- Rated **UL94 V0**

Available Reinforcements (standard)

Carbon: 200g/m^2 2x2 twill fabric, T300 3K fibre

Glass: 300g/m^2 8 harness satin fabric, E-glass fibre

Note – other reinforcements are available on request. Please enquire for details.

Storage & Out Life

This material should be kept frozen at -18°C for a maximum storage life. If kept refrigerated at 6°C storage life will be reduced to 2 months. It must be kept sealed in a polythene bag which must not be opened until fully thawed to room temperature. If the material is not fully used, then the material must be resealed in the polythene bag to prevent moisture absorption.

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Cure Cycles & performances

RECOMMENDED CURE CYCLES:

Autoclave cure

P3 Release film recommended

- For carbon prepreg:
  - **90°C** for **15 mins** then **100°C** for **3 hrs**, at a ramp rate of **2-3°C/min**
- For glass prepreg:
  - **90°C** for **15 mins** then **130°C** for **1 hr**, at a ramp rate of **2-3°C/min**

Oven cure

- Contact SHD for details

Press cure

- Contact SHD for details

Notes:

- The cures given are as a guide only and will be subject to changes in part geometry and construction.

- Other cure cycles may be considered depending on the exact reinforcement type and laminate requirements. As PS200 is new and unique resin technology we would strongly recommend you contact SHD's Technical Department for more detailed advice.

- Due to the chemical nature of this material, water is evolved during the cure. If press curing, the press may need to be vented during the cure for best results. If curing under vacuum, it is recommended that a water trap is placed in the vacuum line to prevent moisture contamination to the vacuum system.

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Cured Material Properties

Flame Propagation

UL94 vertical burn rating: **V0**

Material tested: 8x PS200 – G300 (7781) – 33%RW prepreg
Cured 1h@130°C

UL94 conditions and ratings

Conditions	V - 0	V - 1	V - 2
Afterflame time for each individual specimen A or B	≤ 10 s	≤ 30 s	≤ 30 s
Total afterflame time for any condition set (A+B) for 5 specimens	≤ 50 s	≤ 250 s	≤ 250 s
Afterflame plus afterglow time for each individual specimen after the second flame application (B+C)	≤ 30 s	≤ 60 s	≤ 60 s
Afterflame or afterglow of any specimen up to the holding clamp	NO	NO	NO
Cotton indicator ignited by flaming particles or drops	NO	NO	YES

Test results

MT/GM/2642	PS200 2mm laminate material				
Specimen No.	A	B	C	D	E
1	2.0	8.2	Nil	No	No
2	2.0	5.1	Nil	No	No
3	2.5	8.1	Nil	No	No
4	2.0	6.2	Nil	No	No
5	2.0	8.8	Nil	No	No

23°C conditioned

MT/GM/2642	PS200 2mm laminate material				
Specimen No.	A	B	C	D	E
1	2.0	4.1	Nil	No	No
2	2.60	3.0	Nil	No	No
3	2.90	8.0	Nil	No	No
4	2.70	5.0	Nil	No	No
5	2.10	5.2	Nil	No	No

70°C conditioned

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Mechanical Properties

*Tests performed on **PS200-C200T-HS-3K-42%RW** laminates* *(200gsm 2x2 twill, T300 3k carbon fabric)*

Test	Results			*Standard*
Vf	Fibre volume fraction	**54.99**	**%**	*BS EN ISO 14127 Method B*
CPT	Cured ply thickness	**0.210**	**mm**	*BS EN ISO 14127 Method B*
Tensile 0°	Tensile strength	**752**	**MPa**	*BS EN ISO 527-4*
	Tensile modulus	**63.3**	**GPa**	
	Poisson's ratio	**0.03**		
Tensile 90°	Tensile strength	**665**	**MPa**	
	Tensile modulus	**62.0**	**GPa**	
	Poisson's ratio	**0.04**		
Compressive 0°	Compressive strength	**604**	**MPa**	*prEN 2850 Type B*
	Compressive modulus	**58.9**	**GPa**	
Compressive 90°	Compressive strength	**537**	**MPa**	
	Compressive modulus	**58.1**	**GPa**	
Flexural 0°	Flexural strength	**804**	**MPa**	*BS EN ISO 14125*
	Flexural modulus	**60.1**	**GPa**	
Flexural 90°	Flexural strength	**635**	**MPa**	
	Flexural modulus	**58.1**	**GPa**	
In-Plane Shear ±45°	In-Plane shear strength (5% strain)	**56.5**	**MPa**	*BS EN ISO 14129*
	In-Plane shear strength (ultimate)	**68.7**	**MPa**	
	In-Plane shear modulus	**3.54**	**GPa**	
Interlaminar Shear 0°	Interlaminar shear strength	**39.0**	**MPa**	*BS EN ISO 14130*
Interlaminar Shear 90°	Interlaminar shear strength	**39.8**	**MPa**	
DMA – Dry Tg	Tg E' Onset	**78**	**°C**	*Modified ASTM D7028*
Initial cure	Tg Peak Tan δ	**118***	**°C**	*(Single Cantilever)*

*Mechanical testing carried out at 21±2°C. Initial cure: 15mins at 90°C followed by 3hrs at 100°C, autoclave 6bar. All figures in this report are actual test results and have not been normalised. Testing was either completed by SHD Composites laboratories, or independently by UKAS approved organisations. Complete test reports can be supplied independently upon request. *PS200 can potentially reach a Peak Tan δ Tg above 232°C after high temperature post-cure cycles.*

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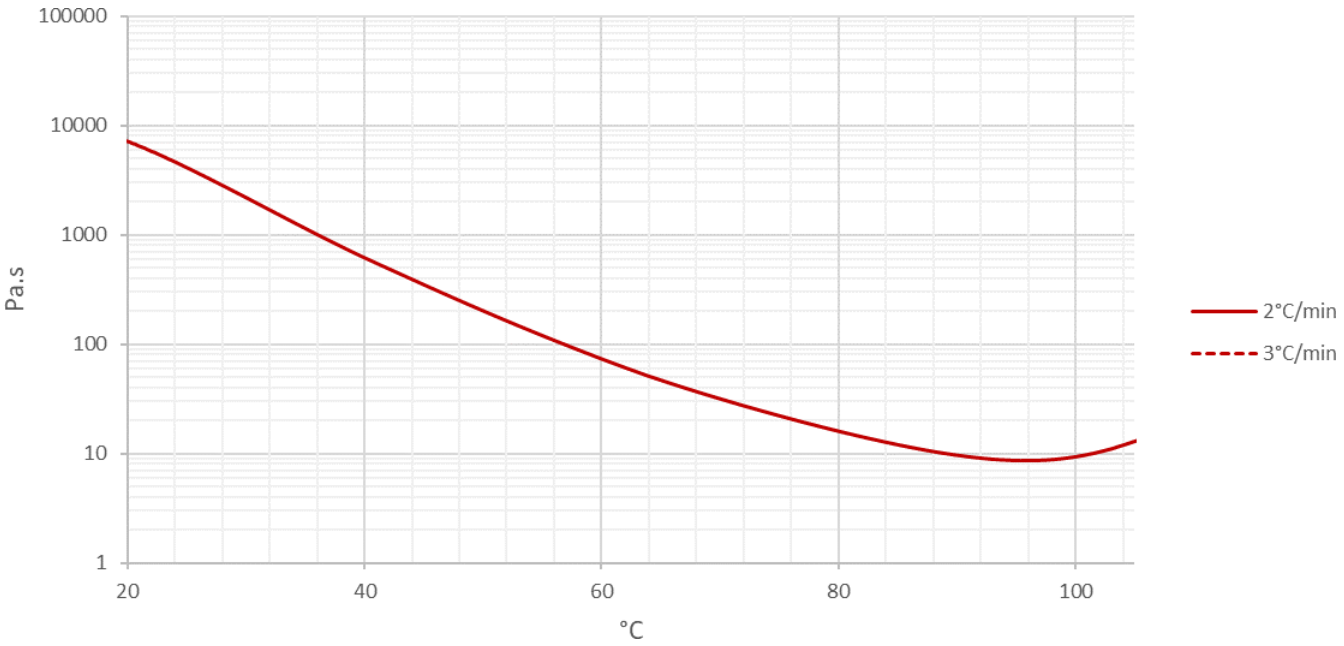
Viscosity Profile

Testing carried out using a rotational rheometer.



Health and Safety

Please refer to the product Safety Data Sheet before using this material. The following precautions must be taken when using PFA resin prepregs:

- Impervious gloves are recommended.
- To avoid exotherm, particular care must be taken with thick laminates.
- Ramp rates must not exceed 3.0°C/min during initial cure and 1.0°C/min during post cure.