



## **PHEPREG® FP-721 221-250°F (105-121°C) CURING PHENOLIC PREPREG**

### **Description**

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Phepreg® FP-721 is an advanced fast cure phenolic prepreg designed to meet the highest FST (Fire, Smoke Toxicity) regulations for all mass transit and aerospace industries. It has a medium tack and provides very good adhesion to core materials such as Nomex® honeycomb, Balsa and Corecell™ T / K-foams.

Phepreg® FP-721 is an excellent choice to manufacture composite laminates or sandwich panels with outstanding flame retardant performance. It can be used with FR Gel-coat to get the best surface from vacuum curing process.

### **Features**

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#### **Prepreg**

- ❖ Excellent flexibility and handling, with medium tack.
- ❖ Weight loss out of the bag: < 1% (even after long exposure time at ambient air).
- ❖ Prepreg weight loss: 5-7% (@ resin content: 35-40%, and cured @ 121°C for 20 min).
- ❖ Fast curing cycle: only **20 min @ 250°F (121°C)**.
- ❖ Suitable for low pressure: 1-3 bar.
- ❖ Self adhesive for core materials and secondary bonding.

#### **Laminate**

- ❖ Excellent surface finish.
- ❖ Superior FST performance.

### **Physical Properties on 7781 E-Glass Fabric**

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- Standard weight: 0.092 lbs/sq. ft. (484 g/m<sup>2</sup>).
- Standard resin content: 38% by weight.
- Standard tack: medium tack on both sides.
- Cured ply thickness: 0.010" (0.254 mm).

[www.abc-prepreg.com](http://www.abc-prepreg.com)

[info@abc-prepreg.com](mailto:info@abc-prepreg.com)



## Typical Applications

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- Laminates and sandwich panels for aircraft and mass-transit interiors.
- Any other applications where:
  - ✓ High temperature resistance is required;
  - ✓ Electrical properties are needed;
  - ✓ Wear resistance is important;
  - ✓ Good chemical resistance and dimensional stability are essential.

## Prepreg Storage Life

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6 months @ 64-68°F (18-20°C).

## Press Cure Cycles

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- Heat the mold tool to 176°F (80°C).
- Place the prepreg material in the mold and apply pressure of **1-10 bar** (14-147 psi), **while raising** the temperature to 250°F (121°C), at a rate 5-9°F (3-5°C).
- Relax the pressure, **bumping/breathing**, during the temperature raising phase (1<sup>st</sup> 2-4 min), **before reaching the gel point**, in order to release the water vapor generated by the phenolic curing reaction (few trials should be performed to determine the best pressure relaxation times for each part).
- Hold the part in the mold at 250°F (**121°C**), for **20 min** (or at 266°F/130°C, for 10 min), under pressure.
- Cool the part to 149°F (**65°C**), and then release the pressure gradually for part removal.

## Oven/Vacuum Cure Cycles

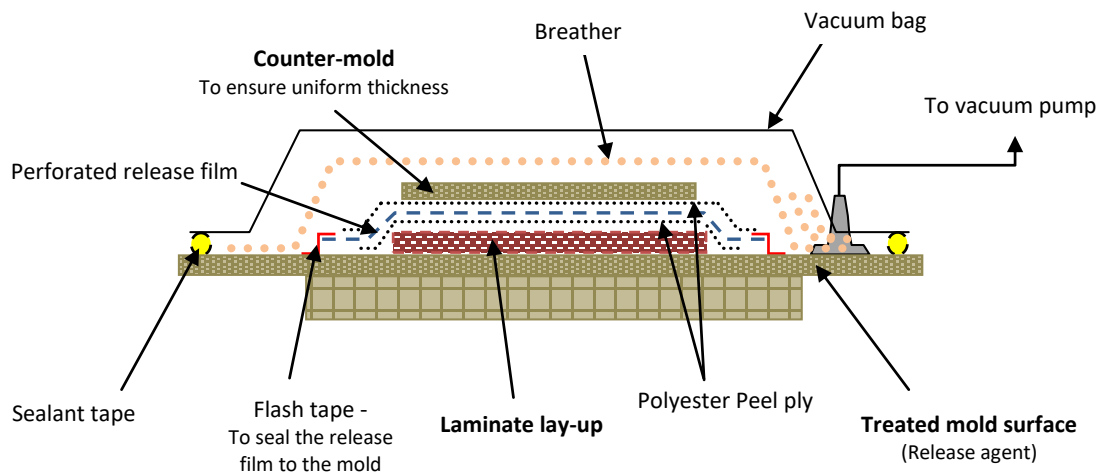
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- Apply 24" Hg vacuum for 5-10 minutes before beginning heat cycle.
- Raise laminate temperature from room temperature to 250°F (121°C) within 30-45 min.
- Hold laminate at 250°F (**121°C**) for **20 min**.
- Cool the laminate to 150°F (65°C), at no more than 8°F/min, prior to release vacuum pressure.

➤ In case FR Gel-coat is being used:

- Apply 24" Hg vacuum for 5-10 minutes before beginning heat cycle.
- Raise laminate temperature from room temperature to 194°F (90°C) within 20-30 min.
- Hold laminate at 194°F (90°C) for **30 min.**
- Raise laminate temperature from 194°F (90°C) to 250°F (121°C).
- Hold laminate at 250°F (121°C) for **20 min.**
- Cool the laminate to 150°F (65°C), at no more than 8°F/min, prior to release vacuum pressure.

**Recommended Bagging Arrangement**



**Note down**

In case of vacuum bag processing, one ply of lightweight breather, 120 gsm, is recommended. A heavyweight breather, 340 gsm, has to be used in case of Autoclave processing. In both cases, two or three additional layers of breather have to be applied locally beside the vacuum ports.

### Alternative Oven Curing Cycles

Laminate Temp. (°C)	Dwell time (Hrs.)	Barcol Hardness	Standard
100	2.0	40-45	ASTM D2583
105	1.0	45-50	-
105	1.5	50-55	-
105	2.0	55-60	-
110	1.0	55-60	-
110	1.5	65-70	-
110	2.0	70-75	-

#### Note down

- It must be understood that the curing time starts only after the prepreg temperature achieves the recommended temperature. The **use of a thermocouple is a must** to monitor the actual prepreg temperature.
- In case of vacuum bag processing, one ply of lightweight breather, 120 gsm, is recommended. A heavyweight breather, 340 gsm, has to be used in case of Autoclave processing. In both cases, two or three additional layers of breather have to be applied locally beside the vacuum ports.
- In some applications, a **post-cure @ 320-482°F (160-250°C)**, is required for optimum performance.

### Glass Transition Temperature – DSC\* [E-Glass PW 185 gsm laminate - vacuum cured @ 121°C for 20 min]

\* 10 °C/min

<b>Post Cure (°C – min)</b>	0 - 0	160 – 30	160 – 60	160 – 90	200 – 60	250 - 60
<b>Scan Range (°C)</b>	25 - 200	25 - 210	25 - 210	25 - 210	25 - 300	25 - 300
<b>Apparent T<sub>g</sub> (°C)</b>	150 - 155	175 - 180	185 - 190	185 - 190	210 - 215	210 - 218
<b>T<sub>g</sub> (°C)</b>	-	-	-	-	280 - 285	280 - 285



**Cured Laminate FST Performance** [E-Glass 7781, 38% R.C. by weight - 4 mm thick, 20 min. @ 120°C & 2 hrs. @ 200°C]

• **Flammability** **FAR 25.853 - Appendix F/ISO 5659 – 2 1994**

- ✓ Extinguishing time Nil
- ✓ Burn length Nil
- ✓ Drip extinguishing time No dripping

• **Heat Release** **FAR 25.853 (d)**

- ✓ HR - up to 3 min. (kW.min/m<sup>2</sup>) Not measurable
- ✓ HR @ 4 min. (kW.min/m<sup>2</sup>) 7.5
- ✓ HR @ 4 min. (kW/m<sup>2</sup>) 30

• **Smoke and Toxicity**

	<b>Smoke Density</b>	<b>Toxicity (concentration in ppm @ 4 minutes)</b>						
		CO	NO / NO <sub>2</sub>	HCN	HCl	HF	SO <sub>2</sub> / H <sub>2</sub> S	HBr
<b>FAA requirements*</b>	< 150	< 1000	< 100	< 150	< 150	< 100	< 100	-
<b>Phepreg® FP-721</b>	<b>20.6*</b> / <b>15.84**</b>	<b>40</b>	<b>2</b>	0	0	0	0	0
<b>Comment</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>

\* With pilot flame / \*\* without pilot flame

▪ For Airbus – AITM 3.0005, and Boeing – BSS 7239



**Cured Laminate Mechanical Properties**

[cured @ 120°C for 20 min. \* Post-cured 2 hrs. @ 160°C]

Mechanical Properties	Reinforcement		
	E-Glass 8H Satin 7781 *		UD Stitched 12K T700
	25°C	80°C	25°C
<b>0 ° Tensile,</b>			
Strength,	Mpa	305	240
	Ksi	44.2	34.8
Modulus,	Gpa	-	-
		-	-
<b>0 ° Flexural,</b>			
Strength,	Mpa	408	310
	Ksi	59.2	44.9
Modulus,	Gpa	24	20
		3.5	2.9
<b>0 ° Compressive,</b>			
Strength,	Mpa	421	340
	Ksi	61.1	49.3
<b>0 ° Interlaminar Shear,</b>			
Strength,	Mpa	32.4	25
	Ksi	4.7	3.6
			27
			3.9

**Storage and Handling**

Phepreg® prepregs should be stored in their original packaging barrier film, or an equivalent film, and maintained air-tight at less than **64-68°F (18-20°C)**, and in a dry place.

**Safety Precautions**

The usual precautions should be observed. The prepreg contains mainly uncured synthetic resins. The operator has to use an appropriate mask/respirator and work in a clean, dry (R.H. = 50% or less), and ventilated area. The use of clean disposable inert gloves provides protection for the operator and avoids contamination of material and components.

**Important Notice**

The data reported in this sheet are based on representative samples. Since the method and circumstances of handling and processing are keys to the material performance, Gulf Composite Materials does not guarantee this data. Users should make their own assessment of the suitability of any product for the performance required.