



# HexPly<sup>®</sup> M47

140°C curing epoxy matrix

## Provisional Product Data

### Description

HexPly<sup>®</sup> M47 is a toughened, self extinguishing 140°C curing epoxy resin matrix that has been developed for the performance car market. It exhibits good strength retention at elevated temperature, good processability and excellent surface finish. Its high T<sub>g</sub> allows HexPly<sup>®</sup> M47 to be considered as an alternative to 180°C curing matrices when a lower curing temperature is required.

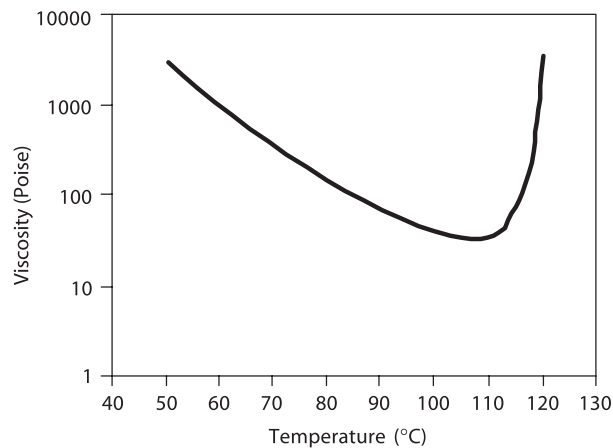
### Benefits and Features

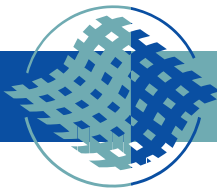
- Good tack and drape characteristics
- Long shelf life and out life
- High T<sub>g</sub> > 150°C
- Good strength retention at high temperatures
- Good toughness
- Excellent surface finish

### Resin Matrix Properties

Colour	Transparent
Density (g/cm <sup>3</sup> )	1.24
Curing Enthalpy (J/g) DSC 10°C/min	421
Gel time at 120°C (min)	8 - 13
Gel time at 140°C (min)	2 - 3.5
T <sub>g</sub> after 1 hour at 120°C (°C) DSC 20°C/min	143
T <sub>g</sub> after 1 hour at 140°C (°C) DSC 20°C/min	155
Minimum viscosity heating at 2°C/min (poise) Rheometrics	35
Temperature of minimum viscosity heating at 2°C/min (°C) Rheometrics	108

Viscosity profile (heat up rate 2°C/minute)





## Cured Prepreg Properties (cured at 140°C)

### Woven Carbon Prepreg

42% resin weight with C193PW(HTA) - 193 g/m<sup>2</sup> plain weave 3K HTA 49% fibre volume

Property	Test Method	Conditioning	Test Temp	Result
0° Tensile Strength (MPa) Modulus (GPa)	ASTM D-3039	23°C	23°C	920
		23°C	23°C	60
0° Compressive Strength (MPa)	ASTM D-965	23°C	23°C	715
		23°C	90°C	537
0° Flexural Strength (MPa)  Modulus (GPa)	ASTM D-790	23°C	23°C	950
		23°C	90°C	932
		23°C	23°C	43
		23°C	90°C	40
0° Interlaminar Shear Strength (MPa)	ASTM D-2344	23°C	23°C	80
		23°C	90°C	57
		60°C-90%RH	60°C	39

### Unidirectional Carbon Prepreg

1947 - 38% resin weight with M46J 52.5% fibre volume or IM2-C 53% fibre volume

Property	Test Method	Conditioning	Test Temp	M46J	IM2-C
0° Tensile Strength (MPa) Modulus (GPa)	ASTM D-3039	23°C	23°C	1823	2326
		23°C	23°C	213	153
90° Tensile Strength (MPa)  Modulus (GPa)	ASTM D-3039	23°C	23°C	50	-
		23°C	90°C	46	
		23°C	23°C	7.6	
		23°C	90°C	5.3	
0° Compressive Strength (MPa)	ASTM D-965	23°C	23°C	1052	-
0° Flexural Strength (MPa)  Modulus (GPa)	ASTM D-790	23°C	23°C	1120	-
		23°C	90°C	906	
		23°C	23°C	199	
		23°C	90°C	191	
0° Interlaminar Shear Strength (MPa)	ASTM D-2344	23°C	23°C	81	92
		23°C	90°C	54	63
		60°C-90%RH	60°C	46	44

**Comparison of 140°C and 120°C Cure Cycles**

HexPly® M47 matrix 38% resin weight with M46J 52.5% fibre volume - unidirectional prepreg

Property	Test Method	Conditioning	Test Temp	120°C cure	140°C cure
0° Compressive Strength (MPa)	ASTM D-965	23°C	23°C	965	1052
0° Interlaminar Shear Strength (MPa)	ASTM D-2344	23°C	23°C	80	81
		23°C	90°C	58	54

**Toughness** (cured at 140°C)

Prepreg Type	Unidirectional Carbon	Carbon 193g/m <sup>2</sup> plain weave
Fibre	AS4	HTA
Resin Content (%)	35	42
Layup	(+45/0/-45/90)4S=32 plies	-
Compression After Impact (MPa) @ 6.67 J/mm	196	-
G <sub>1c</sub> (J/m <sup>2</sup> ) tested to CASA I+D-E 290 specification	-	585

**Curing Conditions**

90 minutes at 120°C or 90 minutes at 140°C, 1 - 7 bar pressure. Heat up rate 1 - 2°C/minute.

Curing at temperatures above 140°C does not further increase the glass transition temperature.

**Prepreg Storage Life****Out Life:** 30 days at RT (23°C/73 °F)**Shelf Life:** 12 months at -18°C (0 °F) (from date of manufacture)**Definitions:****Shelf Life:** The maximum storage life for HexPly® Prepreg, upon receipt by the customer, when stored continuously, in a sealed moisture proof bag, at -18°C (0 °F). To accurately establish the exact expiry date, consult the box label.**Out Life:** The maximum accumulated time allowed at room temperature between removal from the freezer and cure.**Storage Conditions**

HexPly® M47 prepregs should be stored as received in a cool dry place or in a refrigerator. After removal from refrigerator storage, prepreg should be allowed to reach room temperature before opening the polythene bag, thus preventing condensation. (A full reel in its packaging can take up to 48 hours).



## Precautions for Use

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The usual precautions when handling uncured synthetic resins and fine fibrous materials should be observed, and a Safety Data Sheet is available for this product. The use of clean disposable inert gloves provides protection for the operator and avoids contamination of material and components.

## Important

All information is believed to be accurate but is given without acceptance of liability. Users should make their own assessment of the suitability of any product for the purposes required. All sales are made subject to our standard terms of sale which include limitations on liability and other important terms.

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## For More Information

Hexcel is a leading worldwide supplier of composite materials to aerospace and other demanding industries. Our comprehensive product range includes:

- Carbon, glass, aramid and hybrid prepregs    ■ Honeycomb cores
- Structural film adhesives    ■ Honeycomb sandwich panels
- Special process honeycombs    ■ RTM materials

For further information, please contact your nearest sales office, or visit our website at [www.hexcel.com](http://www.hexcel.com)

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