HexPly® M20

130°C *(265°F)* curing epoxy matrix

Product Data

Description

HexPly® M20 is an epoxy structural prepreg, designed to provide high temperature performance combined with a low energy cure cycle. Due to its processing flexibility (vacuum bag or autoclave) it is ideally suitable for composite repair. HexPly® M20 cures at 130°C *(265°F)* to form a tough, high temperature resistant fibre-reinforced composite.

HexPly® M20 has been chosen as a standardised repair material by the Commercial Aircraft Composite Repair Committee (CACRC) which sets global aerospace standards for composite repair.

HexPly® M20 is available as woven carbon and UD carbon tape for structural repairs. The pre-impregnated woven glass version is used for non-structural galvanic corrosion protection.

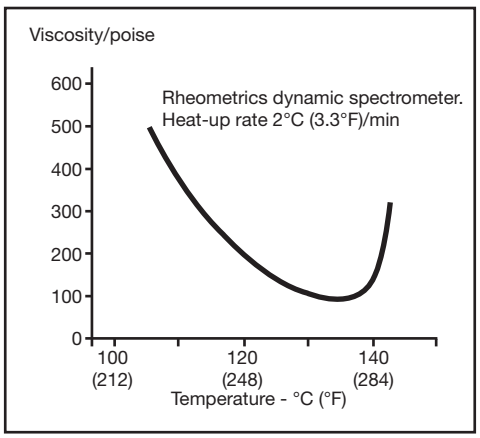
Benefits and Features

- Short cure cycle allowing quick & efficient repair
- Low pressure moulding capability: vacuum bag cure – heater blanket
- Excellent temperature performance – laminate properties similar to 180°C *(350°F)* curing system
- Long room temperature tack life
- Excellent drape and tack
- Available as carbon UD tape, woven carbon and woven glass

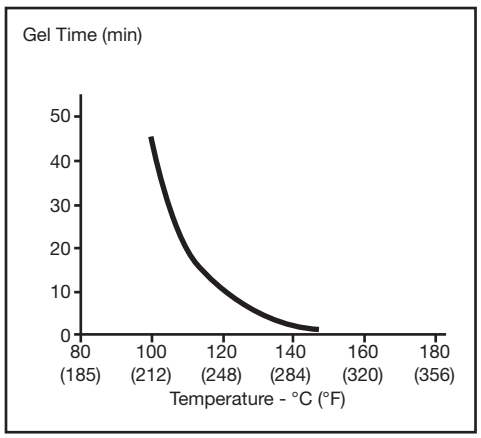
Composite repair prepreg kits are available through Hexcel approved distribution channels.

Resin Matrix Properties

Rheology



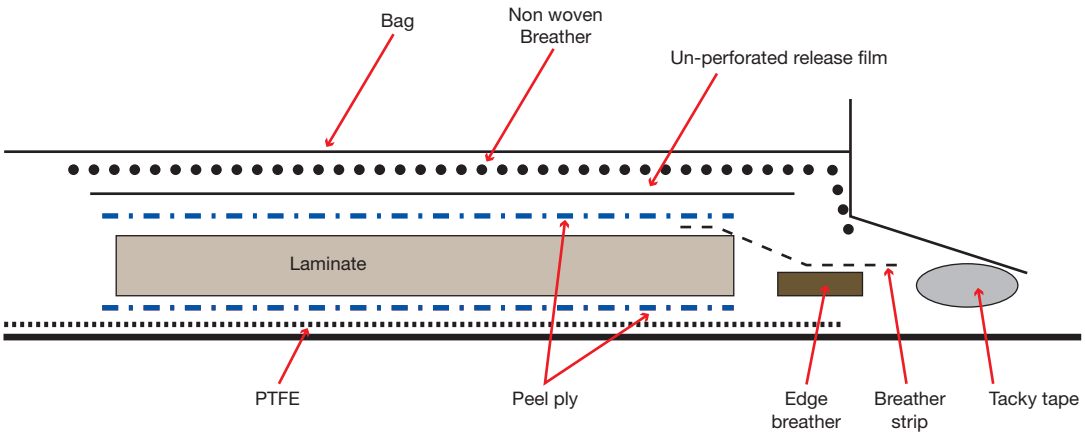
Gel Time



Prepreg Lay-up

To achieve the best laminate quality, vacuum debulking of plies may be necessary to ensure removal of air trapped during the lay-up process.

A repair should be carried out according to the Aircraft Structural Repair Manual (SRM). As an indication, the drawing below shows Hexcel's typical bagging configuration for curing mechanical test laminates:



Prepreg Curing Conditions

Typical cure vacuum bag (no pressure) or autoclave (1-3 bars):
Full vacuum (> -0.75bar)
Heat up rate: 0.5 - 1°C/min
Dwell: 120 - 240 min at 130°C
Cool down rate: at 3°C/min under vacuum

The optimum cure cycle, heat up rate and dwell period depend on part size, laminate construction, oven capacity and thermal mass of the tool.

For thick repairs a dwell and a slower heat up rate are recommended to slow down and equalise the temperatures in the repair.

Prepreg Physical Properties

Property	Units	M20/40%/G904	M20/34%/134/IM7 (12K)	M20/39%/120
Weave	-	Plain Weave	UD	4-H satin E-glass
Nominal Fibre Mass	g/m^2	193	134	105
Nominal Prepreg Mass	g/m^2	322	203	172
Theoretical Calculated Cured Ply Thickness	mm	0.211	0.129	0.094
Theoretical Calculated Fibre Volume	%	52	58	44
Cured Resin Density	g/cm^3	1.27		
Fibre Density	g/cm^3	1.78	1.79	2.56
Theoretical Calculated Laminate Density	g/cm^3	1.53	1.57	1.83

Cured Carbon Prepreg Properties

Test	Units	M20/40%/G904 (1)	M20/34%/134/IM7 (12K) (2)
Glass Transition Temp. (extrapolated onset E') - Dry	Method	EN 6032	
	°C	155 (1)	
	(°F)	*(311 (1))*	
Tensile Strength - warp RT test	Method	SACMA 4R-94	EN 2561B
	MPa	877	2790
	(ksi)	*(127)*	*(405)*
Tensile Modulus – warp RT test	GPa	65	175
	(ksi)	*(9)*	*(25)*
Tensile Strength – weft RT test	Method	SACMA 4R-94	-
	MPa	869	-
	(ksi)	*(126)*	-
Tensile Modulus - weft RT test	GPa	65	-
	(msi)	*(9)*	-
Compression Strength - weft RT test	Method	SACMA 1R-94	-
	MPa	840	-
	(ksi)	*(122)*	-
ILSS – warp RT test	Method	SACMA 8R-94	EN 2563
	MPa	78	110
	(ksi)	*(11)*	*(16)*
ILSS – warp 80°C *(175°F)* test	Method	SACMA 8R-94	-
	MPa	60	-
	(ksi)	*(9)*	-
In-plane Shear Strength RT test	Method	SACMA 7R-94	EN 6031
	MPa	110	120
	(ksi)	*(16)*	*(17)*
In-plane Shear Strength 120°C *(250°F)* test	Method	SACMA 7R-94	-
	MPa	80	-
	(ksi)	*(11)*	-

Comments:

(1) Data generated following vacuum bag cure at 125°C *(257°F)* - 2 hours
Data normalised to Vf = 52% - except for ILSS & IPS which are based on actual resin content.

(2) Data generated following vacuum bag cure at 130°C *(266°F)* - 4 hours
Data normalised to Vf = 58% - except for ILSS & IPS which are based on actual resin content.

Theoretical calculated cured ply thickness quoted are based on zero bleed and is determined using the fibre weight, resin content and resin and fibre density.

RT = Room Temperature.

Data quoted is typical values, for comparison only. Additional data could be available on request.

Prepreg Storage Life

Tack Life: 30 days at 23°C *(73°F)*

Out Life: 42 days at 23°C *(73°F)*

Shelf Life: 31 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.

Tack Life: The time, at room temperature, during which prepreg retains enough tack for easy component lay-up.

Out Life: The maximum accumulated time allowed at room temperature between removal from the freezer and cure.

HexPly® M20 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, to prevent condensation (a full roll in its packaging can take up to 48 hours).

Precautions for Use

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

Publication FTA052d (March 2010)

For More Information

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

- Carbon Fibre
- RTM Materials
- Honeycomb Cores
- Carbon, glass, aramid and hybrid prepregs
- HexTOOL® composite tooling material
- Structural Film Adhesives
- Honeycomb Sandwich Panels
- Engineered Core
- Reinforcement Fabrics

For US quotes, orders and product information call toll-free 1-800-688-7734

For other worldwide sales office telephone numbers and a full address list please go to:

http://www.hexcel.com/contact/salesoffices