



HexPly® M81

135°C - 180°C curing epoxy matrix



Product Data Sheet

Description

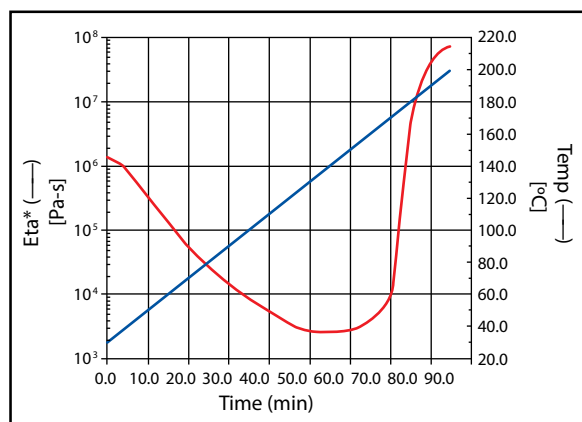
HexPly® M81 is a high performance tough epoxy matrix for use in industrial applications requiring good impact resistance and damage tolerance, such as the automotive industry. HexPly® M81 is based on the highly successful HexPly® 8552 toughened epoxy resin system, used widely around the world for the manufacture of aircraft structures. Non-aerospace customers now have the opportunity to benefit from the excellent performance of this resin system presented with reinforcements specially adapted for industrial markets.

Benefits and Features

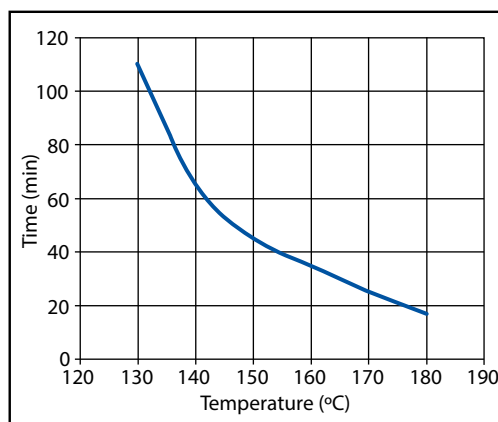
- Toughened epoxy matrix with excellent mechanical properties
- Elevated temperature performance (T_g up to 200°C)
- Versatile cure cycle (from 135°C to 180°C)
- Available on various reinforcements
- Excellent drape and tack

Resin Matrix Properties

Rheology (EN 6043-A, 2°C/min)



Gel time (hot plate)



- Colour
- Density
- Maximum Glass Transition Temperature, T_g onset dry
- Maximum Glass Transition Temperature after ageing, T_g onset wet

Yellow
1,30 g/cm³
200°C
140°C



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Curing Conditions

HexPly® M81 is a flexible curing system and can be cured at temperatures from 135°C to 180°C.

The recommended cure is 3 hours at 135°C. Alternative cure cycles can be used:

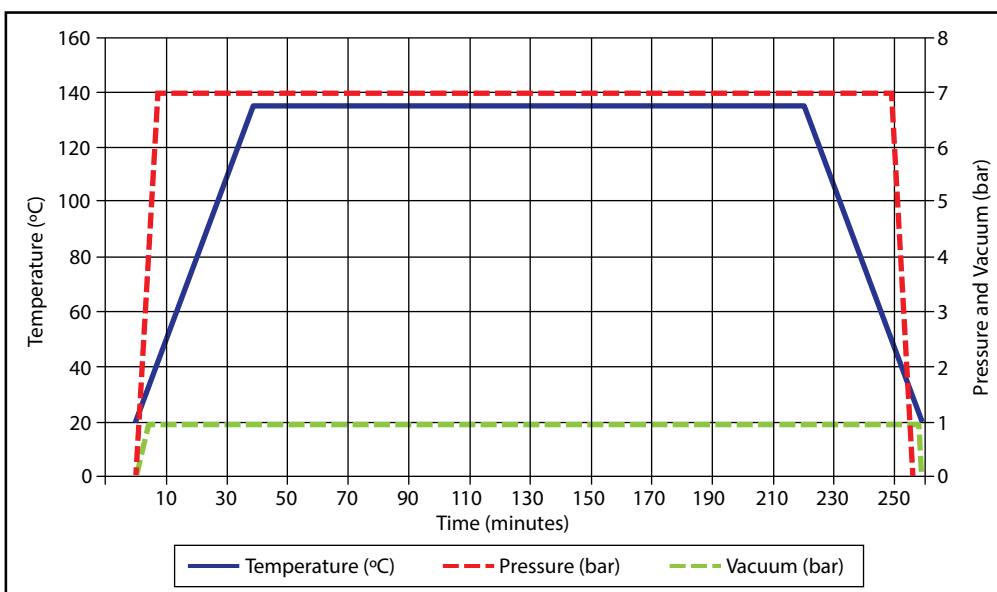
Cure Temperature	135°C	135°C	135°C	150°C	170°C	180°C
Time	2 hours	3 hours	3 hours	2 hours	1 hour	2 hours
T _g * (onset/DMA)	110°C	135°C	135°C	150°C	180°C	200°C
Post cure	1h / 170°C	1h / 170°C	2h / 180°C	–	–	–
T _g * after PC	175°C	180°C	200°C	–	–	–

* T_g Temperature can be slightly different depending of the fabric weight. The lowest values are here above presented.

Curing Cycle for monolithic parts

Typical cure cycle for monolithic parts

1. Apply the full vacuum (1 bar)
2. Apply 7 bars gauge autoclave pressure
3. Heat at 1-3°C/min to 135°C
4. Hold at 135°C for 180 minutes
5. Cool at 2-5°C/minute
6. Vent autoclave pressure when the part reaches 60°C or below



For thick parts intermediary dwell 30 min. at 110° C can be added to limit exotherm and improve health of the part.

Heat-up rates are dependent on component thickness, eg, slow heat-up rates should be used for thicker components and large tools. Accurate temperature measurements of the component should be made during the cure cycles by using thermocouples.

Performance testing should accompany alternative cure cycles to ensure suitability for the particular application.



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Prepreg Physical Properties (Examples only. For the wider prepreg range contact Hexcel)

Product Designation		M81/38%/UD150/CHS	M81/42%/200T2/CHS-3K	M81/42%/370T2/CHS-12K	M81/42%/400T2/CHS-6K
Fibre Weave	–	HS Carbon 30K UD	HS Carbon 3K Twill 2x2	HS Carbon 12K Twill 2x2	HS Carbon 6K Twill 2x2
Mass	g/m ²	150	200	370	400
Nominal Cured Ply Thickness	mm	0.15	0.22	0.41	0.45
Nominal Fibre Volume	%	54.1	50.2	49.9	50.2
Nominal Laminate Density	g/cm ³	1.57	1.54	1.55	1.54

Cured Mechanical Properties (Examples only. For the wider prepreg range contact Hexcel)

Mechanical Properties are based on 135°C cure for 120 minutes, at 6 bar pressure and -0.95 bar vacuum + post curing 60 minutes at 170°C.

Data is the result from several tests on autoclave cured laminates. Some of the values achieved will have been higher, and some lower than the figure quoted. These are nominal values.

Test	Methods	Units	M81/38%/UD150/CHS	M81/42%/200T2/CHS-3K	M81/42%/370T2/CHS-12K	M81/42%/400T2/CHS-6K
Tensile Strength	EN2561	MPa	2500	980	1100	870
Tensile Modulus		GPa	150	67	66	68
Flexural Strength	EN 2562	MPa	1700	1060	1020	1050
Flexural Modulus		GPa	131	58	56	59
ILSS	EN 2563	MPa	115	90	63	67
Comp. Strength	EN 2850B	MPa	1580	890	840	950

NB : Data normalised to Fibre Volume Content (55% for fabrics; 60% for UD) except for ILSS and Flexural.

Compression After Impact (CAI), Interlaminar Fracture Toughness Mode 1 (G_{1c}) and In plan Shear (IPS)

M81/42%/370T2/CHS-12K (2h/135° C + PC 2h/180°C)	CAI - ASTM D7136/D7137 - 6,6J/mm			G_{1c} EN 6033 (J/m ²)	IPS ASTM D3518	
	Indentation (mm)	Damage Area (cm ²)	Strength (Mpa)		Strength (Mpa)	Modulus (Gpa)
	28	14	200		90	4.9



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Prepreg Storage Life

- ¹ Shelf Life: 12 months at -18°C/0°F (maximum, from date of manufacture).
The maximum storage life for HexPly® prepreg, when stored continuously, in a sealed moisture-proof bag, at -18°C/0°F or 5°C/41°F. To accurately establish the exact expiry date, consult the box label.
- ² Out Life: 14 days at room temperature (25°C max).
The maximum accumulated time allowed at room temperature between removal from the freezer and cure.
- ³ Tack Life: 10 days (depending of the reinforcements) at room temperature (25°C max).
The time, at room temperature, during which prepreg retains enough tack for easy component lay-up.

Storage Conditions

HexPly® M81 prepreps 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

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.

For more information

Hexcel is a leading worldwide supplier of composite materials to aerospace and industrial markets. Our comprehensive range includes:

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|------------------------------------|--|---|
| ● HexTow® carbon fibers | ● HexFlow® RTM resins | ● Engineered core |
| ● HexForce® reinforcements | ● HexBond™ adhesives | ● Engineered products |
| ● HiMax® multiaxial reinforcements | ● HexTool® tooling materials | ● Polyspeed® laminates & pultruded profiles |
| ● HexPly® prepreps | ● HexWeb® honeycombs | ● HexAM® additive manufacturing |
| ● HexMC®-i molding compounds | ● Acousti-Cap® sound attenuating honeycomb | |

For U.S. 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:

<https://www.hexcel.com/contact>

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