



HexPly® M81

135°C - 180°C curing epoxy matrix

Product Data

Description

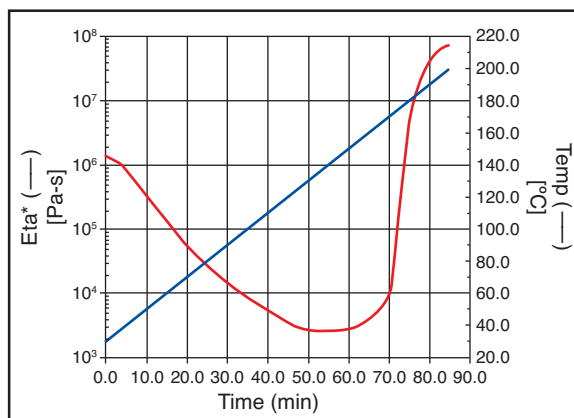
HexPly® M81 is a high performance tough epoxy matrix for use in industrial applications requiring good impact resistance and damage tolerance, such as the automotive industry. HexPly® M81 is based on the highly successful HexPly® 8552 toughened epoxy resin system, used widely around the world for the 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

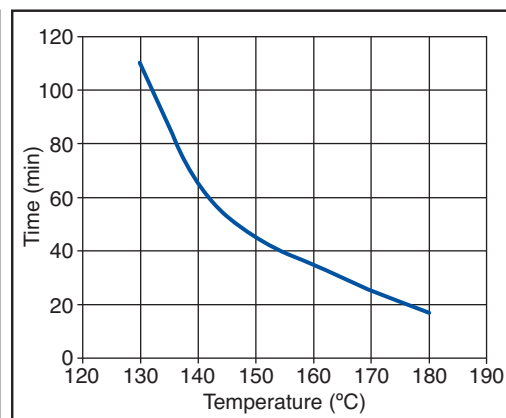
- Toughened epoxy matrix with excellent mechanical properties
- Elevated temperature performance (Tg up to 200°C)
- Versatile cure cycle (from 135°C to 180°C)
- Available on various reinforcements
- Excellent drape and tack

Resin Matrix Properties

Rheology (EN 6043-A, 2°C/min)



Gel time (hot plate)



- | | |
|---|------------------------|
| ■ Colour | Yellow |
| ■ Density | 1,30 g/cm ³ |
| ■ Maximum Glass Transition Temperature, Tg onset dry | 200°C |
| ■ Maximum Glass Transition Temperature after ageing, Tg onset wet | 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:

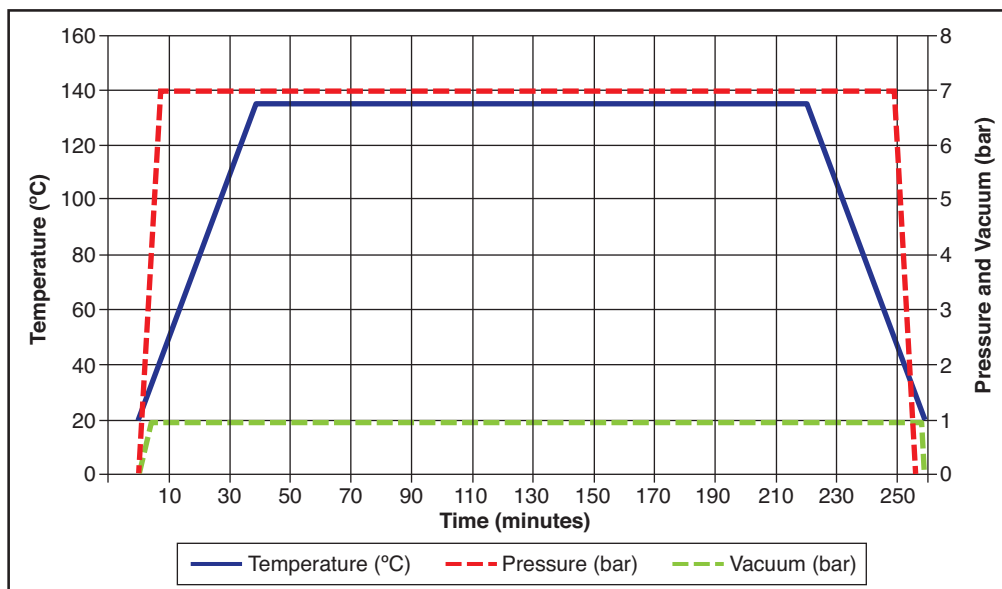
| Cure Temperature | 135°C | 135°C | 135°C | 150°C | 170°C | 180°C |
|------------------|------------|------------|-------------------|---------|--------|---------|
| Time | 2 hours | 3 hours | 3 hours | 2 hours | 1 hour | 2 hours |
| Tg* (onset/DMA) | 110°C | 135°C | 135°C | 150°C | 180°C | 200°C |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

* Tg 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 | 1000 | 90 | 4.9 |



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Prepreg Storage Life

- ¹ Shelf Life: 12 months at -18°C/0°F (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 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

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

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:

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