



HexFlow® RTM6

180°C Mono-component epoxy system for
Resin Transfer Moulding and Infusion technologies



Product Data Sheet

Description

HexFlow® RTM6 is aerospace qualified resin system specially developed for Direct Processes applications, such as Infusion and RTM.

Its service temperatures from - 60°C up to 120°C and cycle processing flexibility make HexFlow® RTM6 ideal for primary & secondary aerospace structures. Long injection windows due to HexFlow® RTM6 low viscosities are easily reached facilitating large parts manufacturing.

HexFlow® RTM6 resin can be used in combination with a wide range of HexForce®, HiTape® and HiMax™ reinforcements. If needed, binders are also available and fully compatible with HexFlow® RTM6. They provide easy preforming properties and reinforcement dimensional stability.

HexFlow® RTM6 when combined with HiTape® & HiMax™ has comparable mechanical properties to latest generation prepregs.

Advantages

- Qualified and well-known for Vacuum Infusion & RTM process
- High glass transition temperatures : dry*: $T_g > 200^\circ\text{C}$; wet*: $T_g > 160^\circ\text{C}$
- Low moisture absorption: 2.0 – 3.0 %
- < 100 mPa.s at process temperatures
- Mechanical properties similar to latest generation prepregs when combined with HiTape® & HiMax™ reinforcements
- Flexible processing and cure cycles

* Dry: 23+/- 5°C/ 50±7% RH

* Wet: 14 days in water at 70°C



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Testing conditions on page 8

Uncured Resin Properties

Viscosity

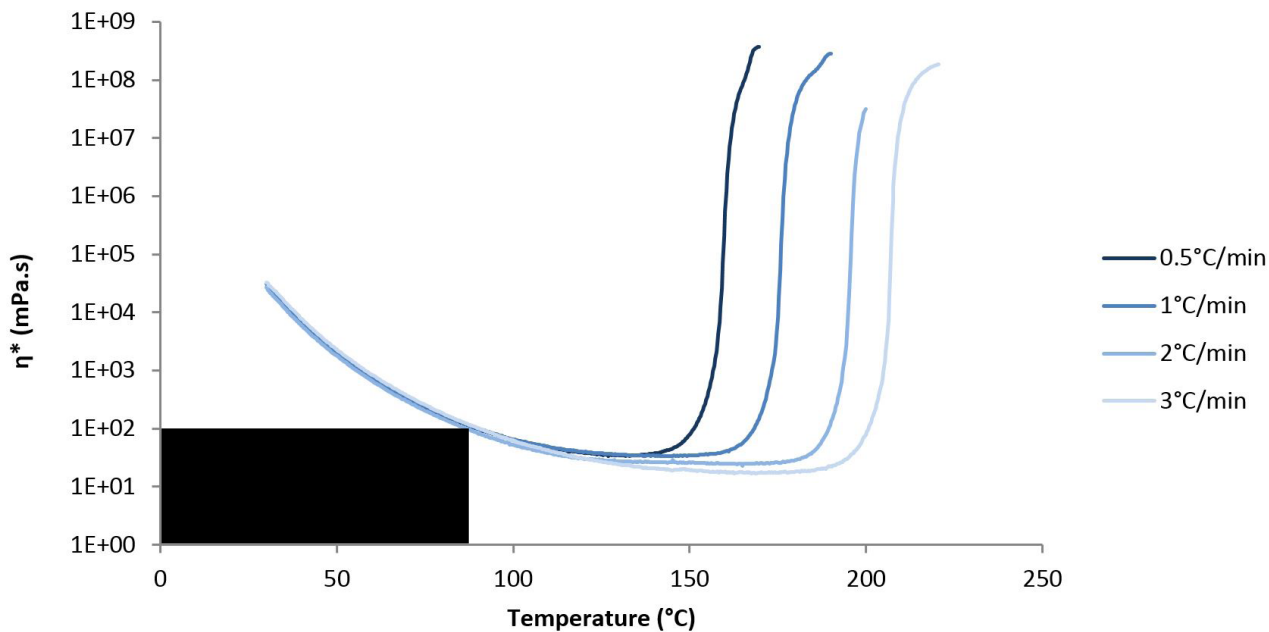


Figure 1: Rheology profile of HexFlow[®] RTM6 resin

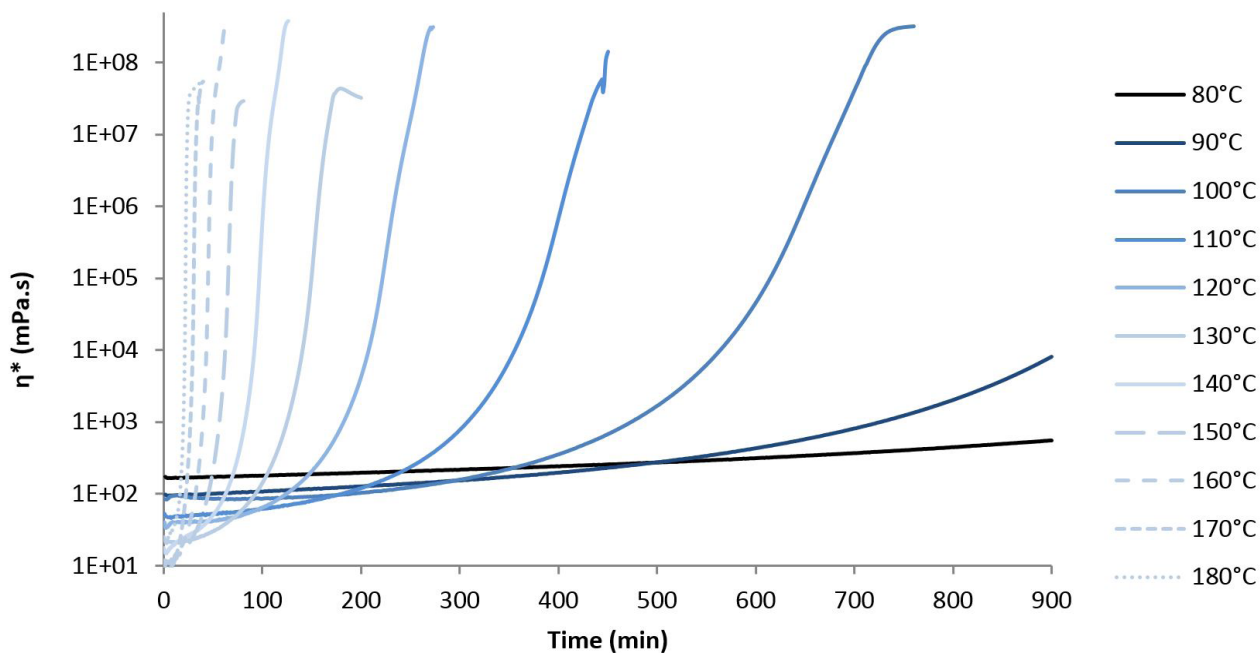


Figure 2: Rheology profile of HexFlow[®] RTM6 resin



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Gel point

Temperature (°C)	Gel time: G' & G'' crossover (hh:min)	Time to reach 1000 mPa.s (hh:min)	Time to reach 200 mPa.s (hh:min)
80	> 15:00	> 15:00	Viscosity > 200mPa.s
90	> 15:00	12:00	
100	11:30	8:00	5:30
110	7:30	5:00	4:00
120	4:00	3:00	2:30
130	2:40	2:00	1:40
140	1:40	1:20	1:10
150	1:00	0:55	0:50
160	0:45	0:40	0:35
170	0:30	0:25	0:25
180	0:20	0:20	0:15

Thermokinetics

Standard DSC parameters			
T _g midpoint (°C)	Enthalpy (J/g)	T peak (°C)	T onset (°C)
-15	450	240	215

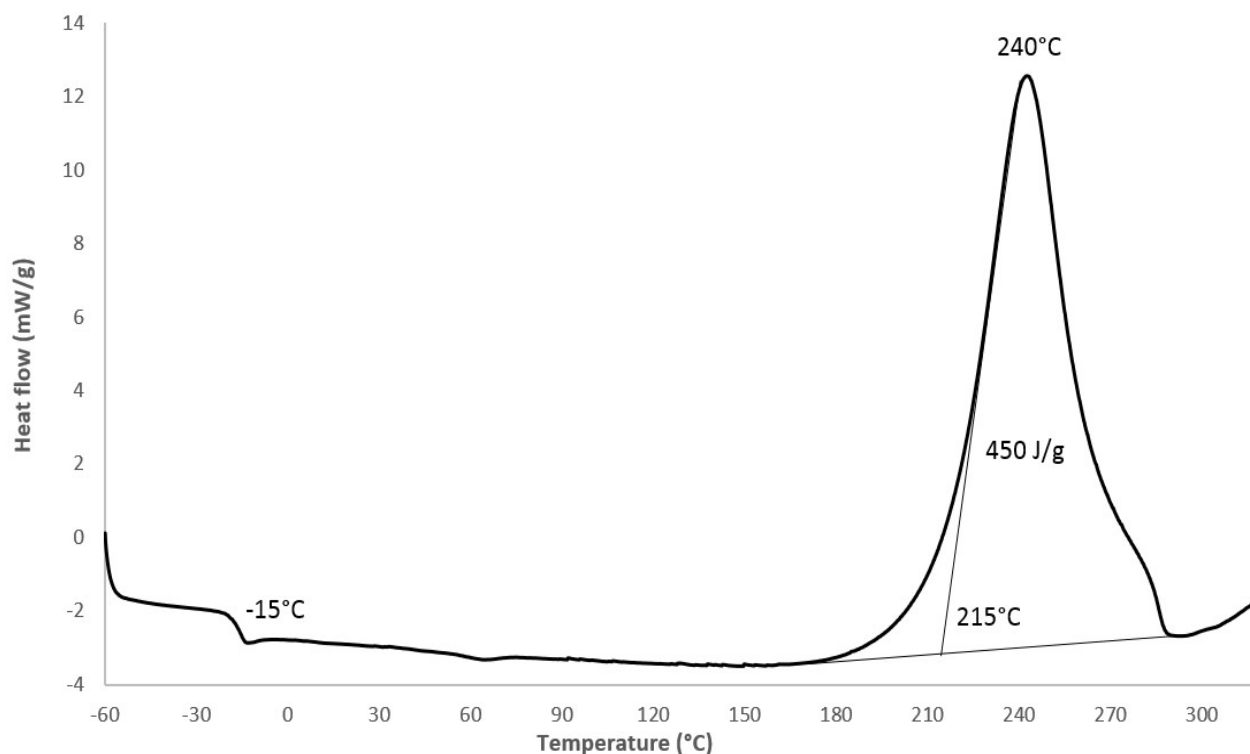


Figure 3: Standard DSC HexFlow[®] RTM6 resin



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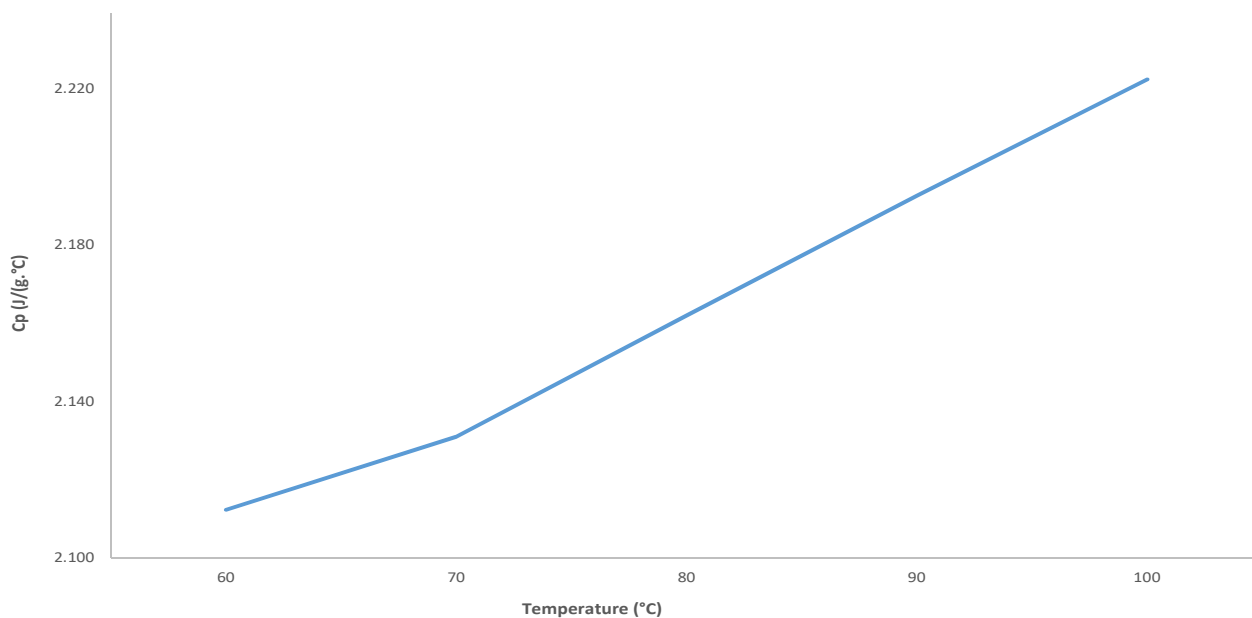


Figure 4: Specific heat of HexFlow[®] RTM6 resin

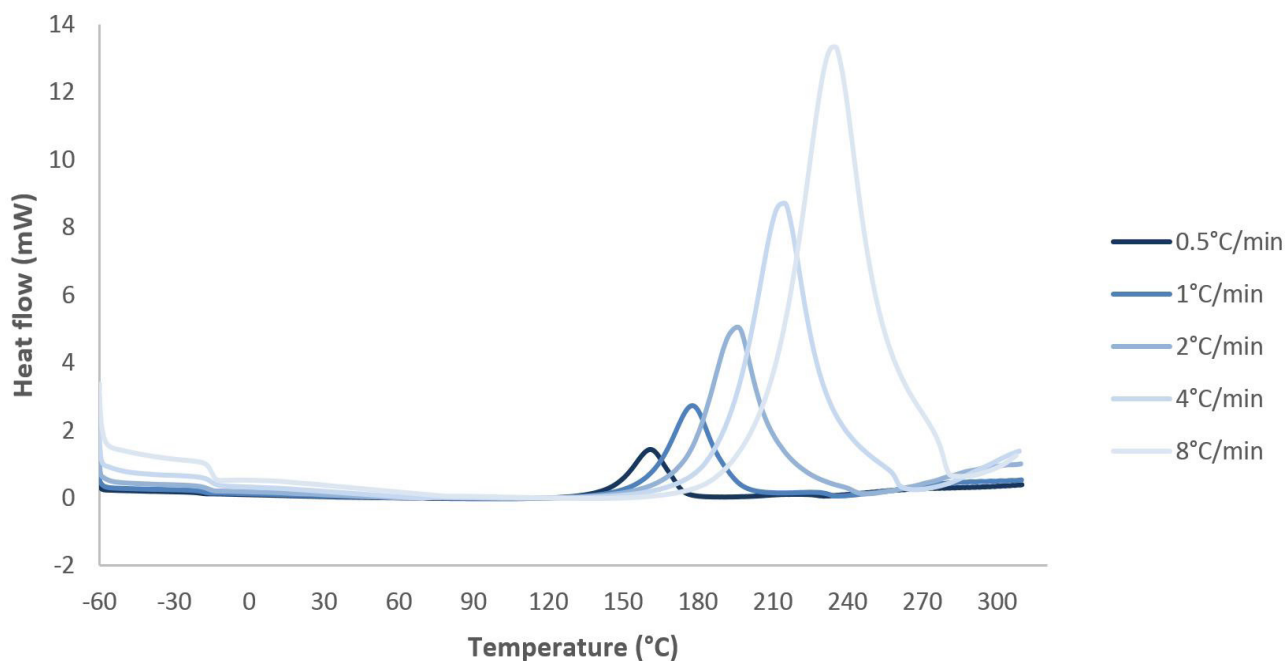


Figure 5: Standard DSC at various heating rates of HexFlow[®] RTM6 resin



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Processing Recommendations

For uncured resin handling, please refer to "Hexcel RTM6 Safety Processing Guidelines" document.

Defrosting:

- 24h at 23°C ± 5°C (10kg)

Process parameters (Infusion or RTM):

- Preheat resin at 80°C (please refer to "Hexcel RTM6 Safety Processing Guidelines" document for maximum preheating time)
- Mold temperature: between 120°C and 140°C, at constant temperature
- Injection / infusion lines: 90 – 110°C
- Mold / bagging leakage: below 15 mbar in 5min
- Vacuum Infusion: below 5 mbar
- RTM Piston Pressure: atm to 5 bars

Cure cycle:

- 90 min minimum at 180°C - no post cure required (degree of cure: $\alpha > 90\%$)

For additional technical information on processing & curing, please contact Hexcel Technical Support.



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Cured Resin Mechanical Properties

Testing conditions on page 8

Neat Resin Cure cycle (Convection oven accurate to $\pm 3^{\circ}\text{C}$)

Parameter (Unit)	Value		
K1c (MPa.m ^{1/2})	0.6		
Density (g/cm ³)	1.14		
Coefficient of thermal expansion ($\mu\text{m}/\text{m}^{\circ}\text{C}$)	-50°C to 20°C	20°C to 100°C	100°C to 180°C
	50	60	75
Moisture uptake (%)	2.0 – 3.0		

Compression (ASTM D695)

Test temperature	23°C $\pm$ 5°C		120°C $\pm$ 5°C	
Conditioning	Dry	Wet	Dry	Wet
Ultimate strength (MPa)	320	300	210	175
Modulus (GPa)	3.2	3.1	2.8	2.3

Tensile (ASTM D638)

Test temperature	23°C $\pm$ 5°C	120°C $\pm$ 5°C
Conditioning	Dry	Wet
Ultimate strength (MPa)	90	40
Modulus (GPa)	3.0	1.9

DMA (EN6032)

T _g (°C)	Dry	Wet
Onset	210	175
Loss	215	190
Tan δ	230	195



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Laminate Mechanical Properties

Testing conditions on page 8

Reinforcement: G0926 DK 1304 TCT (without binder).

Compression (EN2850A1)

Test	Lay up	Property	23°C ± 5°C		120°C ± 5°C	
			Dry	Wet	Dry	Wet
Compression 0°	[0] ₆	Ultimate strength (MPa)	710	540	550	430
		Modulus (GPa)	59.1	62.2	62.0	63.0
Compression 90°		Ultimate strength (MPa)	640	530	530	400
		Modulus (GPa)	60.7	61.0	60.0	61.0

In plane shear IPS (EN6031)

Lay up	Property	23°C ± 5°C		120°C ± 5°C	
		Dry	Wet	Dry	Wet
[(45/135)/(135/45)] _{2S}	Ultimate strength (MPa)	115	95	85	70
	Modulus (GPa)	3.8	4.1	3.4	2.9

Compression after impact CAI (ASTM D7136/ D7137)

Testing	Lay up	23°C ± 5°C, dry		
		Delaminated area (mm ²)	Indent depth (mm)	Gross strength (MPa)
30J impact	[(45/135)/(0/90)] _{3S}	970	0.5	215



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Testing Conditions

Uncured resin data

Isothermal viscosities: EN6043

Gap: 0.5mm

Shear rate: 10 rad/s

Strain: 4%

Rheology profile: EN6043

Gap: 0.5mm

Shear rate: 10 rad/s

Strain: 4%

Temperature range: from 30°C to 250°C

Standard DSC: EN6041

Heating rate: 10°C/min

Temperature range: from -60°C to 350°C

Modulated DSC:

2 heating cycles: from -10°C to 110°C then from
-50°C to 280°C at 2°C/min, Cp measured on second
heating rate

Oscillation: +/-1°C

Period: 120s

Cured resin data

K1c: ASTM D5045

Density: ISO1183

DMA: EN6032

Mode: fixed frequency, simple cantilever

Amplitude: 15µm

Frequency: 1Hz

Heating rate: 3°C/min

Temperature range: 30°C to 250°C

Compression: ASTM D695

Tensile: ASTM D638

Transport And Storage Of Uncured Resin

For product classification & transport conditions, please refer to HexFlow® RTM6 Safety Data Sheet.

Shelf life:

- 15 days at 23 ± 3°C
- 9 months at temperatures below -18°C

For ease of transportation and storage, HexFlow® RTM6 resin is also available in a bi-component version.

Please refer to HexFlow® RTM6-2 resin Technical Data Sheet for additional information.

For more information

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

- | | | |
|------------------------------------|------------------------------|------------------------|
| • HexTow® carbon fibers | • HexMC® molding compounds | • Acousti-Cap® sound |
| • HexForce® reinforcements | • HexFlow® RTM resins | attenuating honeycomb |
| • HiMax™ multiaxial reinforcements | • Redux® adhesives | • Engineered core |
| • HexPly® prepregs | • HexTool® tooling materials | • Engineered products |
| • HexAM™ additive manufacturing | • HexWeb® honeycombs | • Polyspeed™ laminates |

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/salesoffice>

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