HiFlow® RTM200

130°C Bi-component Epoxy System for Resin Transfer Molding and Infusion Technologies

HEXCEL

Product Data Sheet

Description

HiFlow® RTM200 is an aerospace bi-component toughened resin system with liquid Part A & Part B specially developed for Liquid Composite Molding technologies, such as LRI and RTM. Various applications for HiFlow® RTM200 exist throughout the UAM and UAV markets such as infused blades and other structures.

Delivered as a bi-component system, HiFlow® RTM200 provides several benefits over a mono-component resin: Air shipment is allowed, and storage at 23± 5°C for 12 months and larger packages are possible. HiFlow® RTM200 has a low viscosity, allowing for easy processing. HiFlow® RTM200 has a cure temperature of 130°C and a service temperature of 90° C based on wet Tg. HiFlow® RTM200 Part A:B mixing ratio by weight is 100 : 81.

HiFlow® RTM200 resin can be used in combination with HexForce®, HiTape® and HiMax® reinforcements. HiFlow® RTM200 is fully compatible with Hexcel binders and veils. They provide easy preforming properties and reinforcement dimensional stability.

Advantages

- High glass transition temperatures: dry[1]: Tg> 135°C; wet[2]: Tg> 120°C
- < 100mPa.s at process temperatures
- Toughened system
- Liquid Part A & Part B at room temperature
- Longer shelf life (12 months at RT), as bicomponent system
- Flexible cure cycles available
- Low exotherm system

(1) *Dry: 24h at 105°C*

(2) *Wet: 14 days in water at 70°C*

Testing conditions on page 9

Part A & Part B Properties

Viscosity

- **Part A**

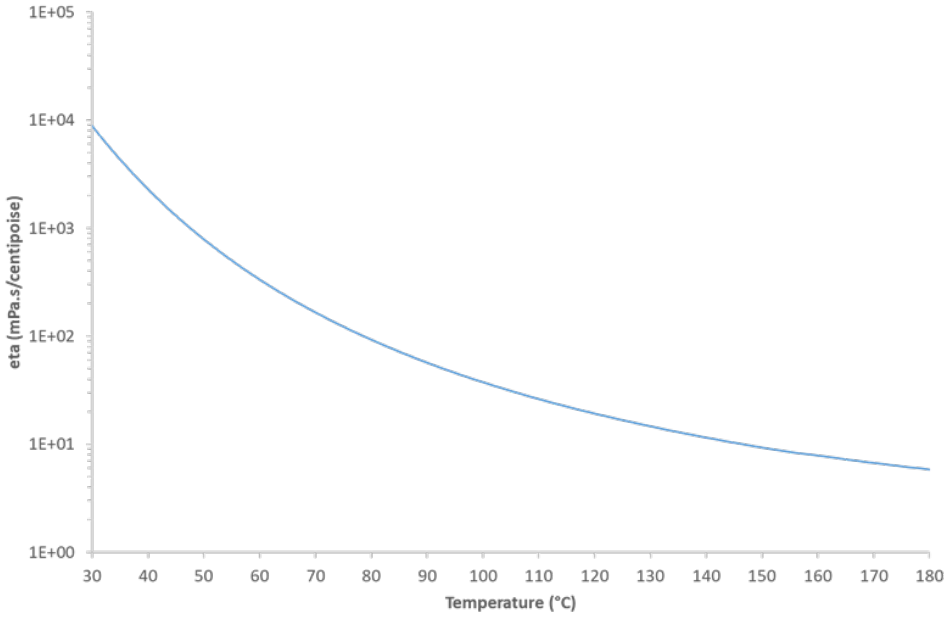

Figure 1: Rheology Profile of HiFlow® RTM200 Part A, 3°C/min Ramp Rate

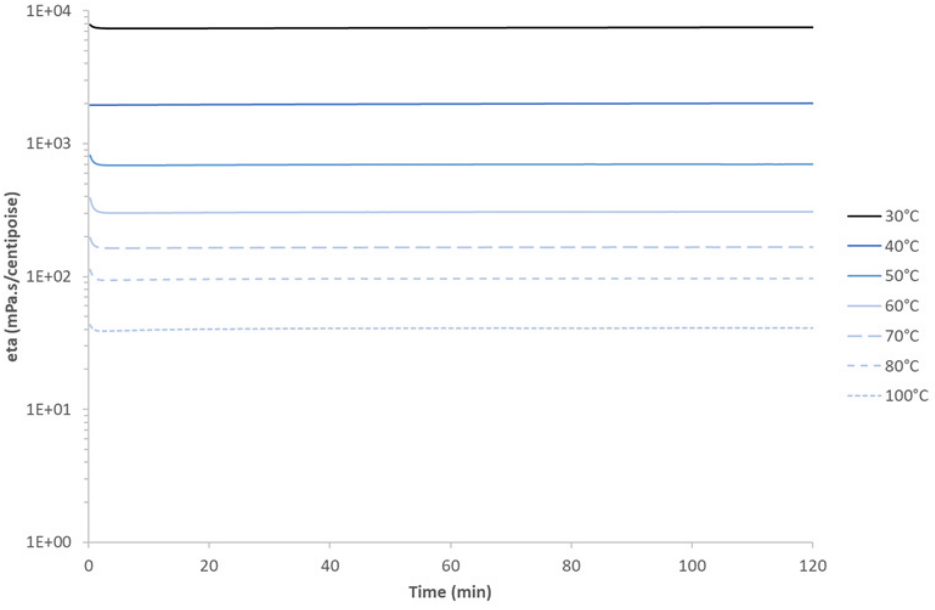

Figure 2: Isothermal Viscosities of HiFlow® RTM200 Part A

- **Part B**

Testing conditions on page 9

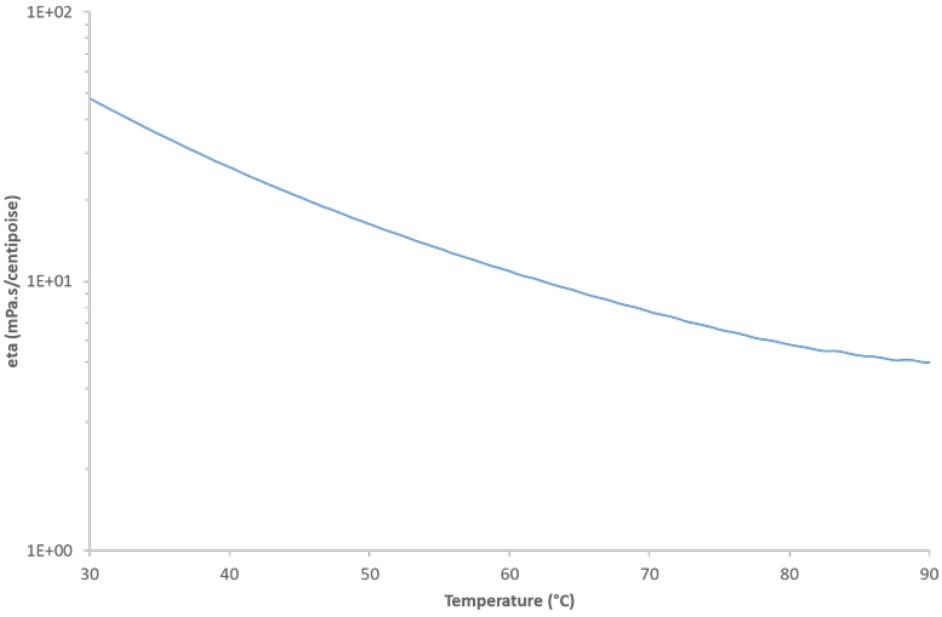

Figure 3: Rheology Profile of HiFlow® RTM200 Part B, 3°C/min Ramp Rate

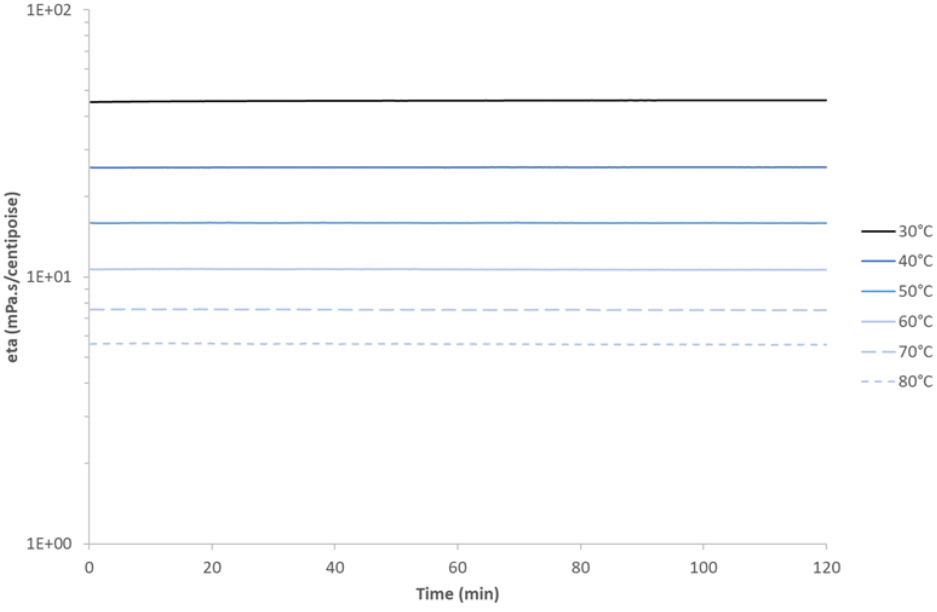

Figure 4: Isothermal Viscosities of HiFlow® RTM200 Part B

Testing conditions on page 9

RTM200 (After Mix) Uncured Resin Properties

Viscosity

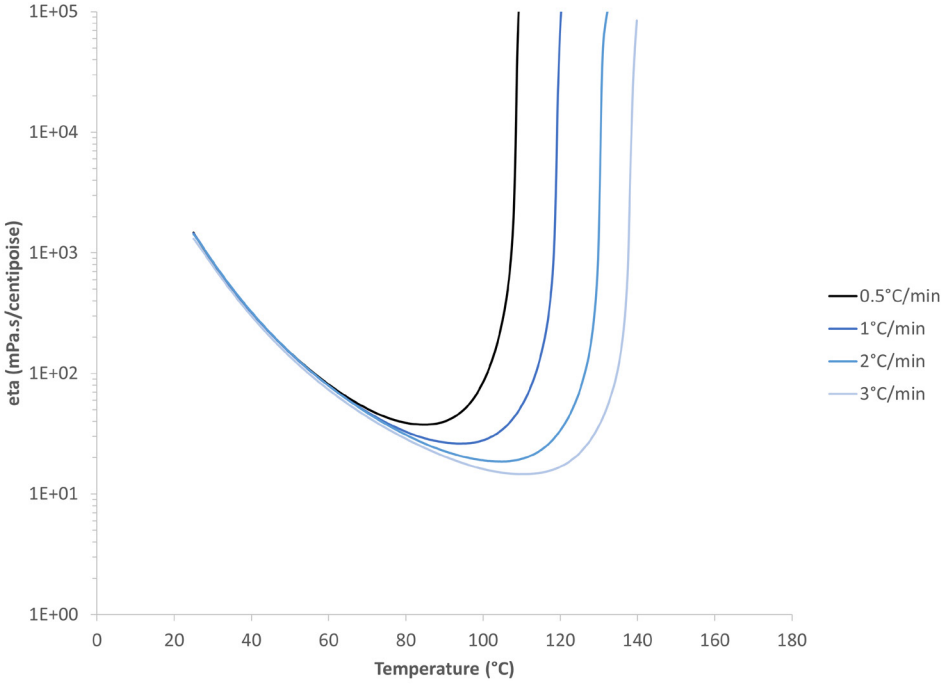

Figure 5: Rheology Profile of HiFlow® RTM200 (After Mix)

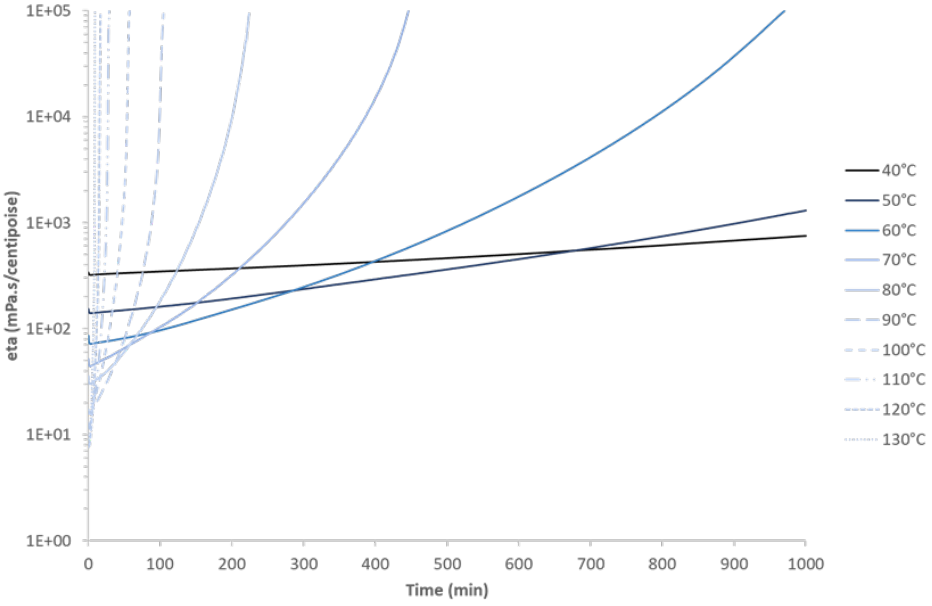

Figure 6: Isothermal Viscosities of HiFlow® RTM200 (After Mix)

Process Window

Testing conditions on page 9

Temperature (°C)	Time to reach 1000 mPa·s (h:min)	Time to reach 200 mPa·s (h:min)
40	> 16:00	Viscosity > 200 mPa·s
50	15:08	—
60	8:45	4:18
70	4:36	2:42
80	2:34	1:43
90	1:28	1:08
100	0:55	0:53
110	0:25	0:21
120	0:15	0:13
130	0:08	0:07

Thermokinetics

Standard DSC parameters			
Tg midpoint (°C)	Enthalpy (J/g)	T peak (°C)	T onset (°C)
-38	300	176	137

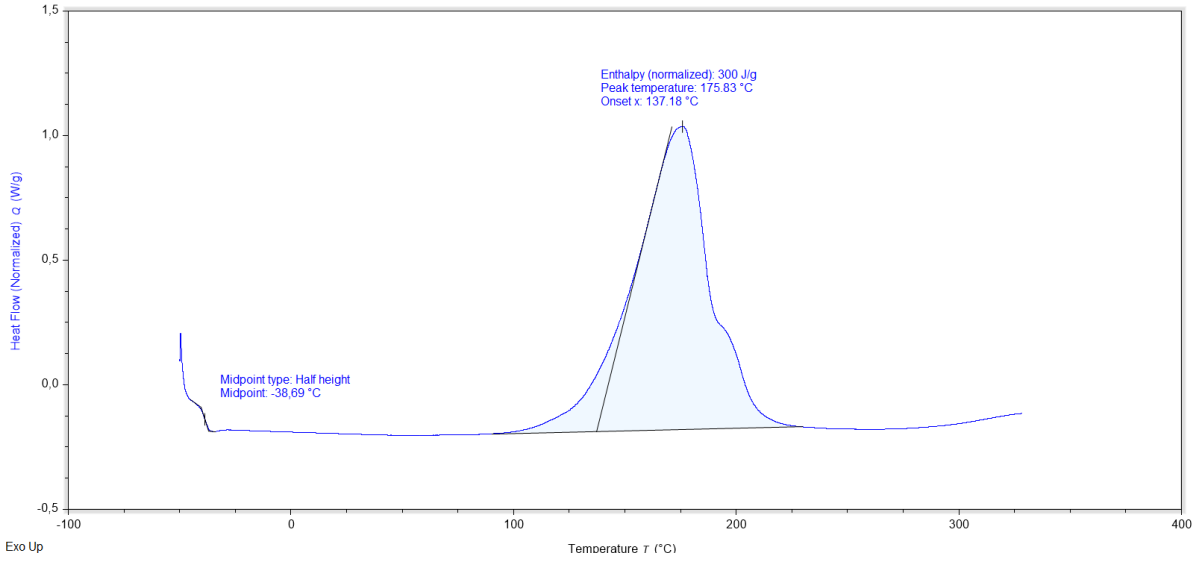

Figure 7: Standard DSC of HiFlow® RTM200 (After Mix)

Testing conditions on page 9

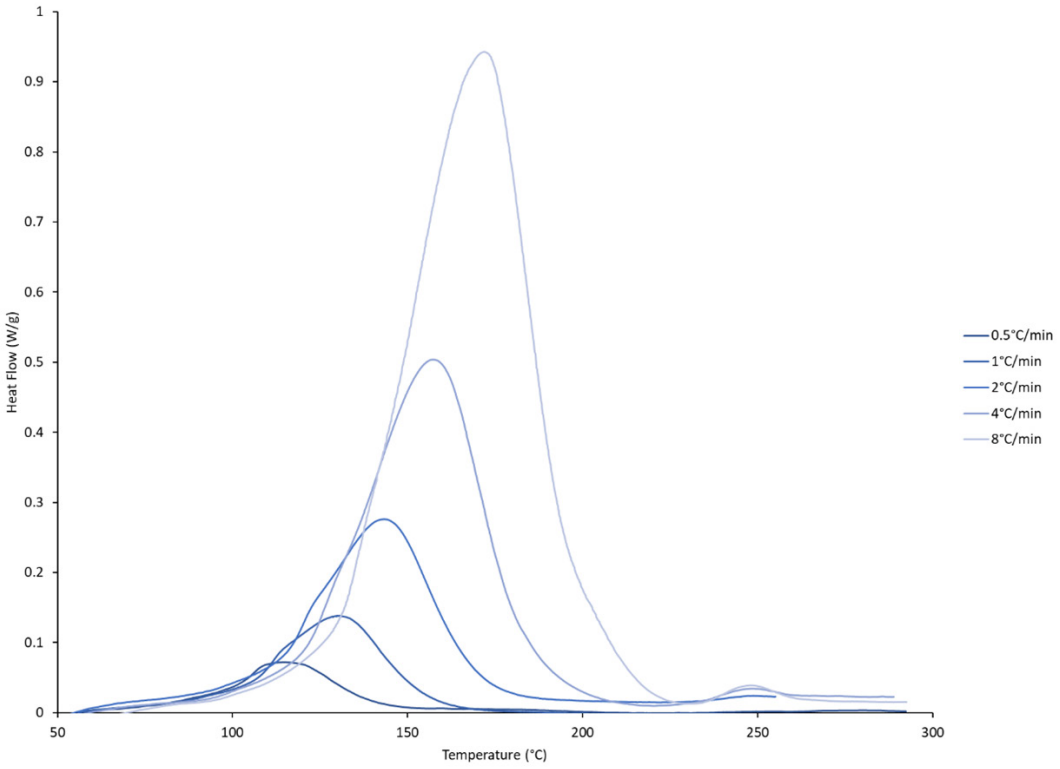

Figure 8: Standard DSC at Various Heating Rates of HiFlow® RTM200 (After Mix)

Processing Recommendations

Testing conditions on page 9

For uncured resin handling, please refer to "Hexcel HiFlow® RTM200 Safety Processing Guidelines" document.

- Mixing ratio by weight (A:B) : 100:81

Process Parameters (Infusion or RTM)

- Preheat resin at 25 - 40°C (77-104°F)
  (Please refer to "Hexcel HiFlow® RTM200 Safety Processing Guidelines" document for maximum preheating time.)
- Mold temperature: between 60°C and 80°C (140 - 176°F), at constant temperature
- Injection / infusion lines: 25 - 40°C (77 - 104°F)
- Mold / bagging leakage: below 15 mbar (0,22 Psi) in 5min
- Vacuum Infusion: below 5 mbar (0,07 Psi)
- RTM Piston Pressure: atm to 5 bars (73 Psi)

Cure Cycle

- 60 min minimum at 130°C (266°F) - no post cure required (degree of cure: $\alpha > 95\%$)

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

Testing conditions on page 9

Cured Resin Mechanical Properties

Neat Resin Cure cycle (Convection oven accurate to ± 3°C)

(1) *Dry: 24h at 105°C*
(2) *Wet: 14 days in water at 70°C*

Parameter (Unit)	Value		
K1c (MPa.m^{½})	1.08		
Density (g/cm^3)	1.195		
Coefficient of thermal expansion (10^{-6} K^{-1})	-50°C to 20°C	20°C to 100°C	100°C to 120°C
	61	71	80
Moisture uptake (%)	1 – 2%		

DMA (EN6032)

Tg (°C)	Dry[1]	Wet[2]
Onset	138	128
Loss Modulus	144	135
Tanδ	148	141

Laminate Mechanical Properties

Reinforcement: HexForce® G0926 HS-6K, 375g/m² 5H Satin (WITH E01 BINDER) FVF=58%.

(3) *Dry: 23 ± 5°C / 50 ± 7% RH*

Test/Property	Method	Lay Up	Condition	Value	
				SI Units	US Units
Tensile Strength	ISO527-4 T3	(0)6	RT/dry[3]	899 MPa	130 ksi
Tensile Modulus			RT/dry	67.6 GPa	9.8 Msi
Compression Strength	EN2850B	(0)6	RT/dry	722 MPa	105 ksi
Compression Modulus			RT/dry	60 GPa	8.7 Msi
ILSS	EN2563	(0)6	RT/dry	64.9 MPa	9.4 ksi
In-Plane Shear Strength	EN6031	(+/-)s	RT/dry	104 MPa	15.1 ksi
In-Plane Shear Modulus			RT/dry	4.3 GPa	0.62 Msi
Open Hole Compression Strength	EN6036	(+/0/-/90)2s	RT/dry	285 MPa	41.4 ksi
Open Hole Tensile Strength	EN6035	(+/0/-/90)s	RT/dry	385 MPa	55.9 ksi
Bearing Strength	EN6037	(+/0/-/90)s	RT/dry	873 MPa	126.6 ksi
CAI [30 J]	EN6038	(+/0)3s	RT/dry	227 MPa	32.9 ksi

Testing Conditions

Uncured Resin Data

Isothermal Viscosities: EN6043
Gap: 0.5mm
Shear rate: 40 1/s
Strain: 4%

Standard DSC: EN6041
Heating rate: 10°C/min
Temperature range: from -50°C to 330°C

Cured Resin Data

K1c: ASTM D5045

Density: ISO1183

DMA: ASTM D7028
Mode: fixed frequency, simple cantilever
Amplitude: 30µm
Frequency: 1Hz
Heating rate: 5°C/min
Temperature range: 25°C to 200°C

Laminate Mechanical Data

Compression: EN2850B

OHC: EN6036

CAI: EN6038

ILSS: EN2563

DMA: ASTM D7028
Mode: fixed frequency, simple cantilever
Amplitude: 30µm
Frequency: 1Hz
Heating rate: 5°C/min
Temperature range: from 25°C to 200°C

Tensile: ISO527-4 T3

OHT: EN6035

IPS: EN6031

Transport and Storage of Uncured Resin
Product classification & transport conditions: Please refer to "HiFlow® RTM200 Safety Data Sheet."

For ease of transportation and storage, HiFlow® RTM200 is only available as a bi-component version.

Shelf Life Before Mixing (Part A & Part B)
- 12 months at room temperature at 23 ± 5°C

Shelf Life After Mixing
- 3 days at 23 ± 5°C

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

- HexTow® carbon fibers
- HexForce® reinforcements
- HiMax® multiaxial reinforcements
- HexPly® prepregs
- HexMC® molding compounds
- HexFlow® RTM resins
- HexBond® adhesives
- HexTool® tooling materials
- HexWeb® honeycomb
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products
- Polyspeed® laminates
- & pultruded profiles

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

ITU-502-JY25