



HexFlow® RTM250ST

180°C Mono-component Epoxy System for Resin Transfer Molding and Infusion Technologies



Product Data Sheet

Description

HexFlow® RTM250ST is the new generation mono-component aerospace resin system specially developed for Liquid Composite Molding applications, particularly RTM processes.

HexFlow® RTM250ST is ideal for engines applications, such as fan blades, containment cases and OGVs due to its high toughness, long term thermal stability & exceptional Tg of 170°C.

HexFlow® RTM250ST can be used in combination with a wide range of HexForce®, 2,5D & 3D fabrics. If needed, binders and veils are also available and fully compatible with HexFlow® RTM250ST. They provide easy preforming properties, reinforcement dimensional stability and toughening properties.

Advantages

- Low moisture absorption: < 1,5%
- High toughness & high rate impact resistance
- Glass transition temperatures: dry¹: Tg>170°C; wet²: Tg>150°C
- Tg long-term thermal stability

⁽¹⁾ Dry: 24h at 105°C

⁽²⁾ Wet: 14 days in water at 70°C



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Uncured Resin Properties

Viscosity

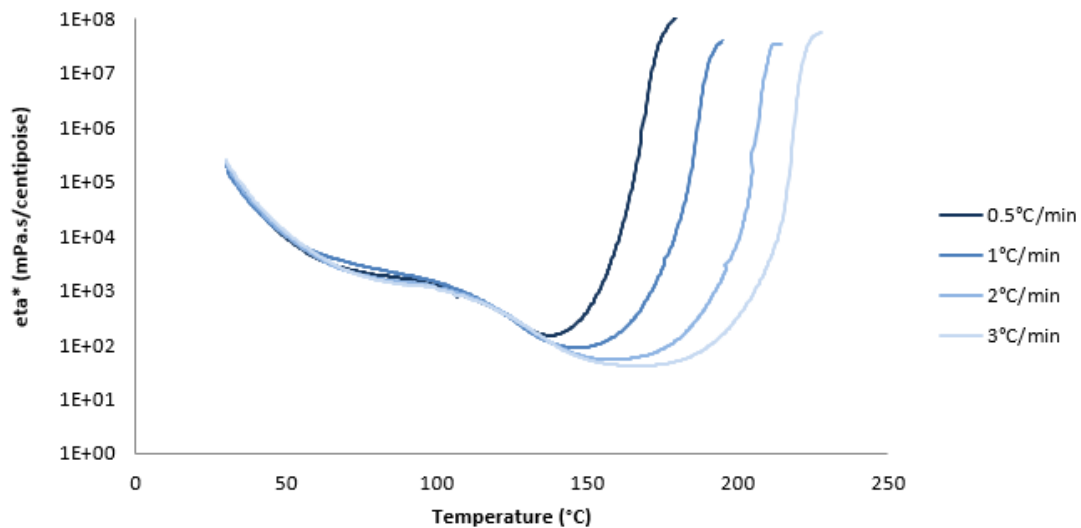


Figure 1: Rheology Profile of HexFlow[®] RTM250ST

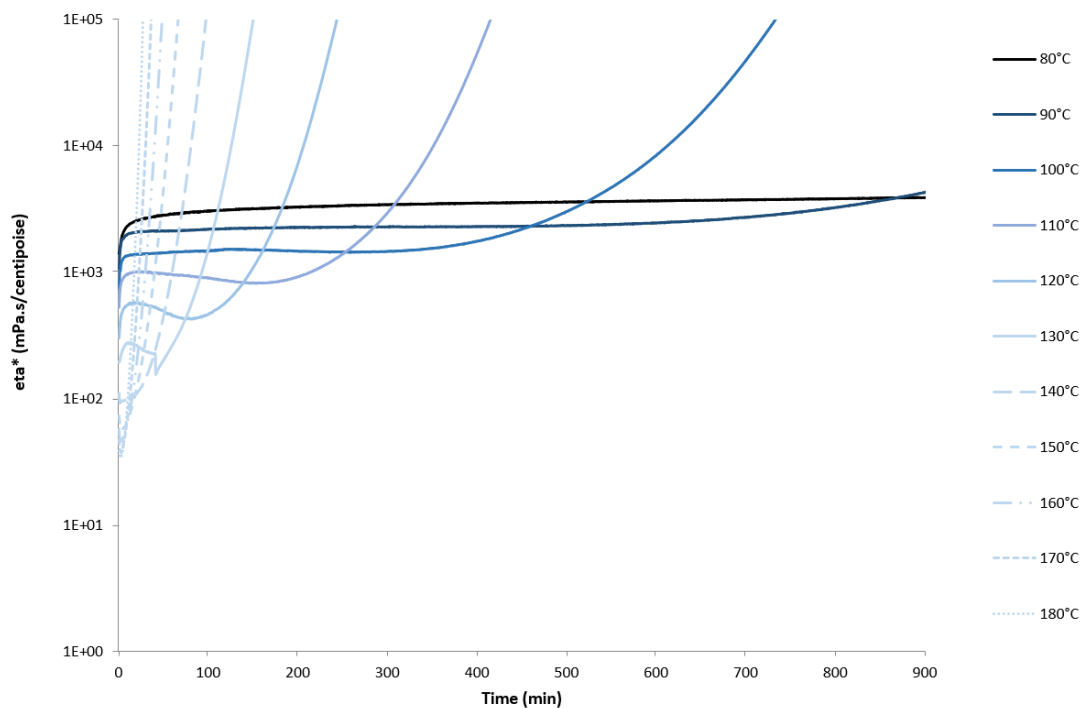


Figure 2: Isothermal Viscosities of HexFlow[®] RTM250ST



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Gel Point

Temperature (°C)	Gel time: G' & G'' crossover (h:min)	Time to reach 1000 mPa's (h:min)	Time to reach 200 mPa's (h:min)
80	> 15:00	Viscosity > 1000 mPa's	Viscosity > 200 mPa's
90	> 15:00		
100	> 15:00		
110	9:10	3:30	
120	5:30	2:15	
130	3:30	1:30	0:35
140	2:15	1:00	
150	1:30	0:40	
160	1:00	0:30	
170	0:45	0:20	
180	0:30	0:15	0:10

Thermokinetics

Standard DSC parameters						
Tg midpoint (°C)	T onset endo (°C)	T peak endo (°C)	Enthalpy endo (J/g)	T onset (°C)	T peak (°C)	Enthalpy (J/g)
-15	120	155	25	190	240	230

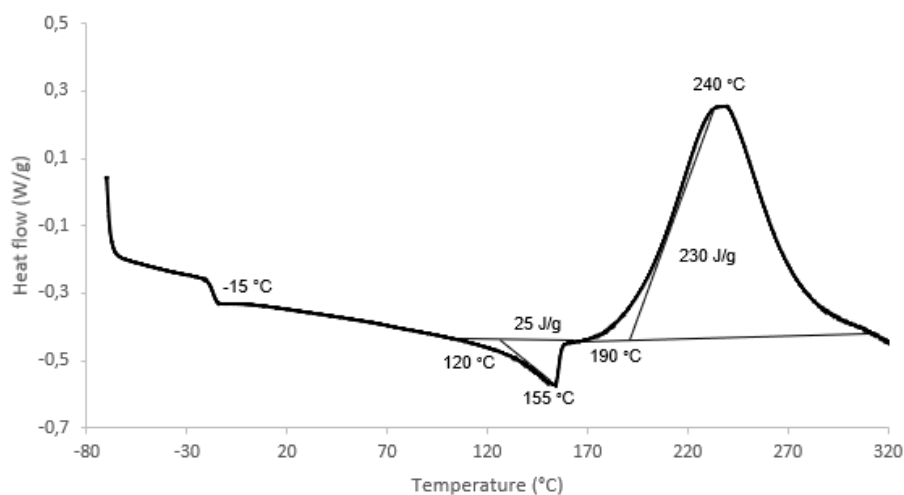


Figure 3: Standard DSC of HexFlow® RTM250ST



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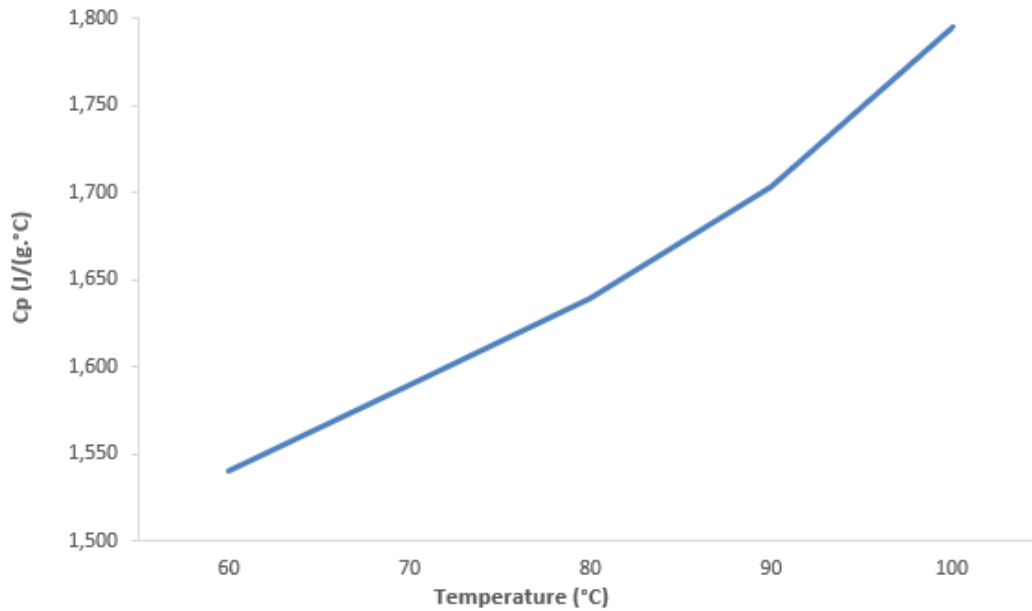


Figure 4: Specific Heat of HexFlow[®] RTM250ST

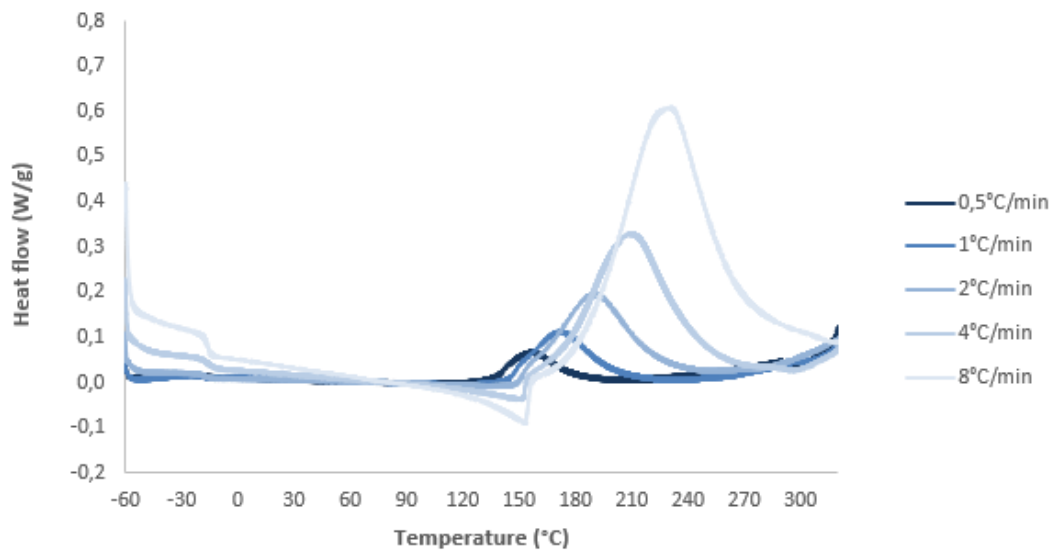


Figure 5: Standard DSC at Various Heating Rates of HexFlow[®] RTM250ST



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Processing Recommendations

Defrosting

- 24h at 23°C ± 5°C (74°F) (for 10kg cans)

Process Parameters

- Preheat resin at 80°C (176°F)
- Mold temperature: between 150°C and 160°C (302°F - 320°F), at constant temperature
- Injection / infusion lines: 100-120°C (212 - 248°F)
- RTM Piston Pressure: atm to 5 bars (73 Psi)

Cure Cycle

- 120 min minimum at 180°C (356°F) - no post cure required (degree of cure: $\alpha \geq 90\%$)

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



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Cured Resin Mechanical Properties

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

⁽¹⁾ Dry: 24h at 105°C

⁽²⁾ Wet: 14 days in water at 70°C

Parameter (Unit)	Value		
K1c (MPa.m ^{1/2})	1,56		
Density (g/cm ³)	1,22		
Coefficient of thermal expansion (10 ⁻⁶ K ⁻¹)	-50°C to 20°C	20°C to 100°C	100°C to 180°C
	60	75	90
Moisture uptake (%)	1,0 - 1,5%		

Compression (ASTM D695)

Conditioning	Dry ¹		Wet ²	
Test Temperature	23°C	120°C	23°C	120°C
Yield strength (MPa)	140	65	130	45
Yield strength (ksi)	20,3	9,4	18,8	6,5
Ultimate strength (MPa)	320	215	325	230
Ultimate strength (ksi)	46,5	31,1	47,1	33,5
Modulus (GPa)	3,5	2,2	3,4	2,0
Modulus (msi)	0,50	0,32	0,50	0,28

Tensile (ASTM D638)

Conditioning	Dry ¹		Wet ²	
Test Temperature	23°C	120°C	23°C	120°C
Ultimate strength (MPa)	90	50	85	30
Ultimate strength (ksi)	13,5	7,0	12,2	4,2
Modulus (GPa)	3,1	2,1	2,9	1,4
Modulus (msi)	0,46	0,30	0,43	0,21

DMA (EN6032)

T _g (°C)	Dry ¹	Wet ²
Onset	170	150
Loss Modulus	175	160
Tanδ	185	165



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Laminate Mechanical Properties

Reinforcement: HexForce[®] G0926 HS-6K, 375g/m² 5H Satin (WITHOUT BINDER).

⁽³⁾ Dry: 23 ± 5°C / 50 ± 7% RH

⁽⁴⁾ Wet: 70 ± 5°C / 85 ± 7% RH until saturation

Compression (EN2850A1)

Test	Lay up	Property	Dry ³		Wet ⁴	
			23 ± 5°C	120 ± 5°C	23 ± 5°C	120 ± 5°C
Compression 0°	[0] ₆	Ultimate strength (MPa)	670	445	635	390
		Ultimate strength (ksi)	97,2	64,5	92,1	56,6
		Modulus (GPa)	60,9	60,8	61,5	67,7
		Modulus (msi)	8,8	8,8	8,9	9,8
Compression 90°		Ultimate strength (MPa)	705	465	660	410
		Ultimate strength (ksi)	102,2	67,4	95,7	59,5
		Modulus (GPa)	61,8	62,9	62,9	67,0
		Modulus (msi)	9,0	9,1	9,1	9,7

In plane shear IPS (EN6031)

Lay up	Property	Dry ³		Wet ⁴	
		23 ± 5°C	120 ± 5°C	23 ± 5°C	120 ± 5°C
[+45/-45] _{2S} (8 plies)	Ultimate strength (MPa)	115	75	110	60
	Ultimate strength (ksi)	16,7	10,9	15,9	8,7
	Modulus (GPa)	4,0	2,7	4,0	1,9
	Modulus (msi)	0,58	0,39	0,58	0,28

Compression after impact CAI (ASTM D7136/ D7137)

Testing	Lay up	23 ± 5°C, Dry ³					
		Delaminated area		Indent depth		Gross strength	
		(mm ²)	(in ²)	(mm)	(in)	(MPa)	(ksi)
30J impact	[+45/0] _{3S} (12 plies)	560	0,87	0,6	0,024	260	37,7



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Testing Conditions

Uncured Resin Data

Isothermal Viscosities: EN6043

Gap: 0,5mm

Shear rate: 10 rad/s

Strain: 4%

Standard DSC: EN6041

Heating rate: 10°C/min

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

Rheology Profile: EN6043

Gap: 0,5mm

Shear rate: 10 rad/s

Strain: 4%

Temperature range: from 30°C to 250°C

Modulated DSC:

from -50°C to 235°C at 2°C/min

Oscillation: +/-1°C

Period: 120s

Cured Resin Data

K1c: ASTM D5045**Compression:** ASTM D695

Modulus strain range: 0.1% - 0.5% & 0.3% - 0.5%

Density: ISO1183**Tensile:** ASTM D638**DMA:** EN6032

Mode: fixed frequency, simple cantilever

Amplitude: 15µm

Frequency: 1Hz

Heating rate: 3°C/min

Temperature range: 30°C to 250°C

Laminate Mechanical Data

Compression: EN2850A1**Tensile:** EN2561B**CAI:** ASTM D7136/ D7137**IPS:** EN6031**DMA:** EN6032

Mode: fixed frequency, simple cantilever

Amplitude: 15µm

Frequency: 1Hz

Heating rate: 3°C/min

Temperature range: from 30°C to 250°C



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Transport and Storage of Uncured Resin

Product classification & transport conditions: Please refer to "[HexFlow® RTM250ST Safety Data Sheet](#)."

Shelf Life

- 30 days at 23 ± 5°C
- 12 months at temperatures below -18°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 | ● HiFlow® RTM resins | ● Engineered core |
| ● HexForce® reinforcements | ● HexBond® adhesives | ● Engineered products |
| ● HiMax® multiaxial reinforcements | ● HexTool® tooling materials | ● Polyspeed® laminates |
| ● HexPly® prepregs | ● HexWeb® honeycomb | ● & pultruded profiles |
| ● HexAM® additive manufacturing | ● Acousti-Cap® sound | |
| ● HexMC® molding compounds | 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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