



HexFlow® RTM230ST

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



Product Data Sheet

Description

HexFlow® RTM230ST is an aerospace qualified mono-component resin system specially developed for Liquid Composite Molding applications, particularly RTM processes.

HexFlow® RTM230ST is ideal for engines applications, such as fan blades, containment cases and OGVs due to its high toughness & Tg long term thermal stability.

HexFlow® RTM230ST 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® RTM230ST. They provide easy preforming properties, reinforcement dimensional stability and toughening properties.

Advantages

- Qualified for RTM process
- Low moisture absorption: < 1,5%
- High toughness & high-rate impact resistance
- Glass transition temperatures: dry¹: Tg>160°C; wet²: Tg>140°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

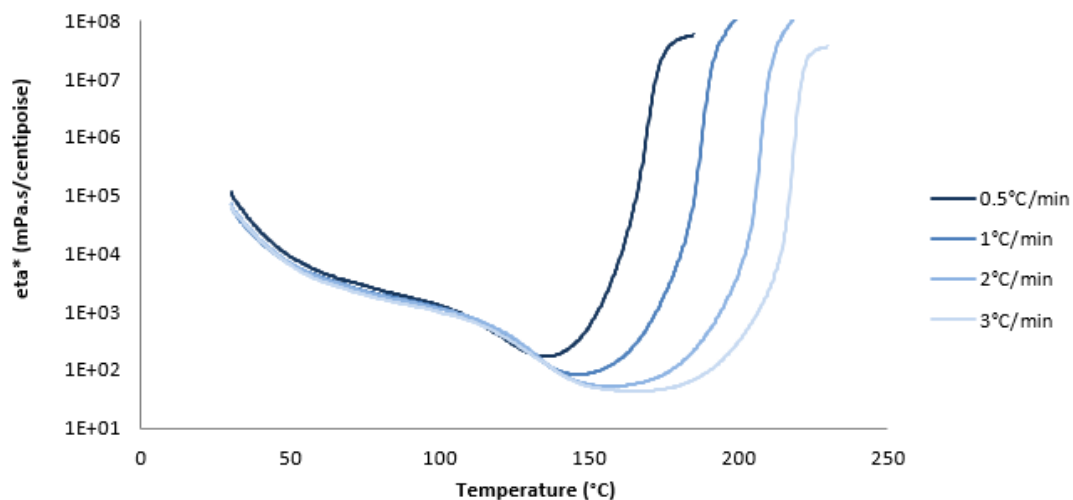


Figure 1: Rheology Profile of HexFlow[®] RTM230ST

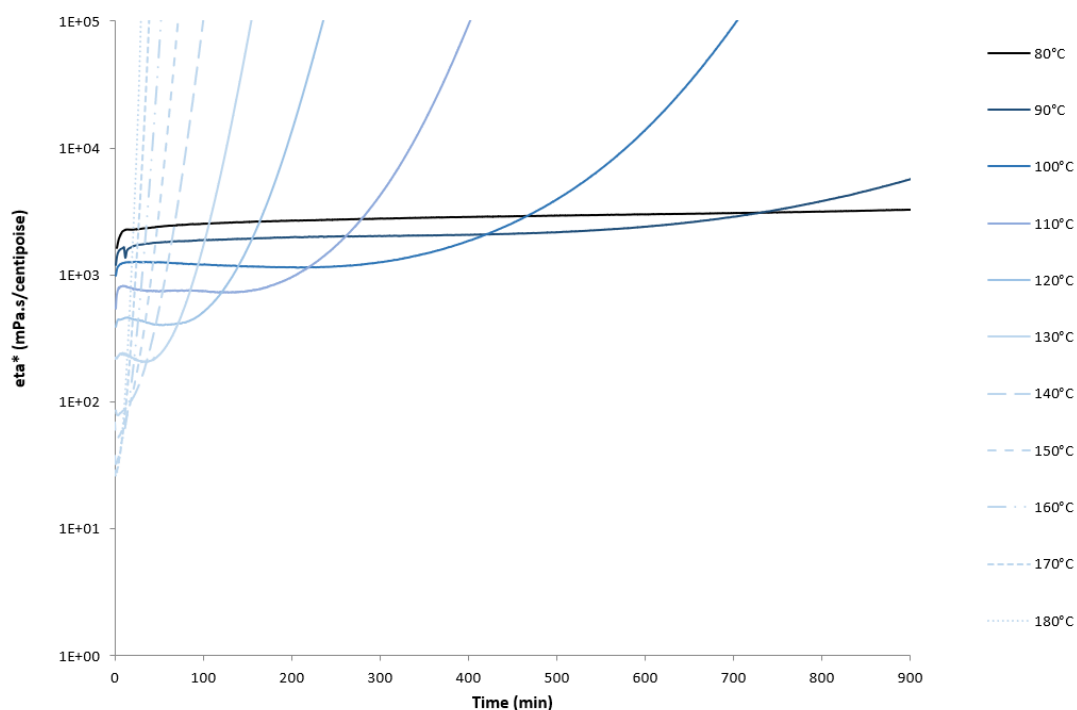


Figure 2: Isothermal Viscosities of HexFlow[®] RTM230ST



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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	9:15	3:25	
120	5:30	2:15	
130	3:45	1:30	0:35
140	2:20	0:55	
150	1:35	0:40	
160	1:05	0:30	
170	0:45	0:20	
180	0:30	0:20	0:10

Thermokinetics

Standard DSC parameters						
T _g midpoint (°C)	T onset endo (°C)	T peak endo (°C)	Enthalpy endo (J/g)	T onset (°C)	T peak (°C)	Enthalpy (J/g)
-20	110	150	25	190	235	215

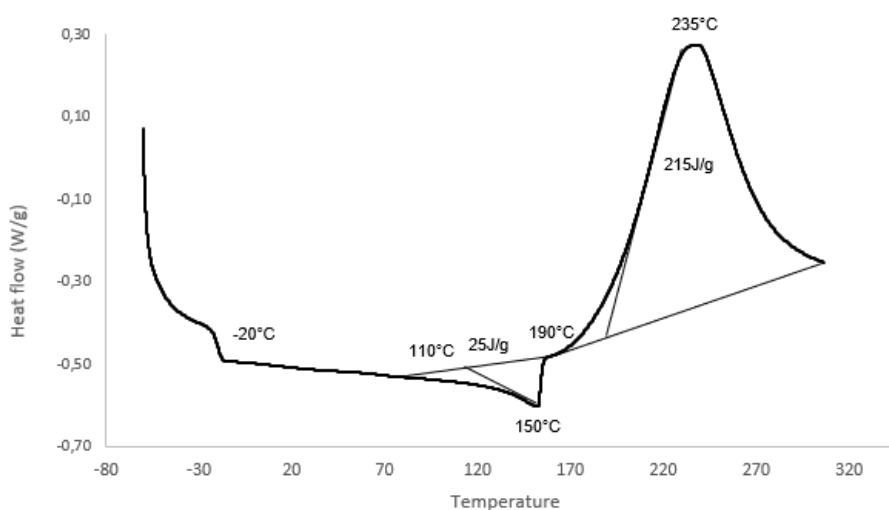


Figure 3: Standard DSC of HexFlow[®] RTM230ST



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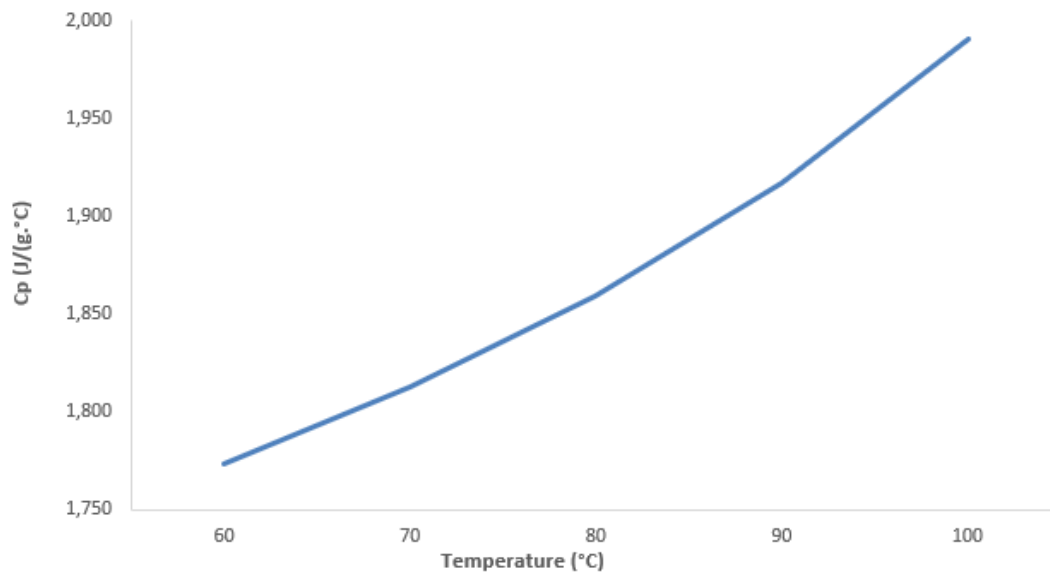


Figure 4: Specific Heat of HexFlow[®] RTM230ST

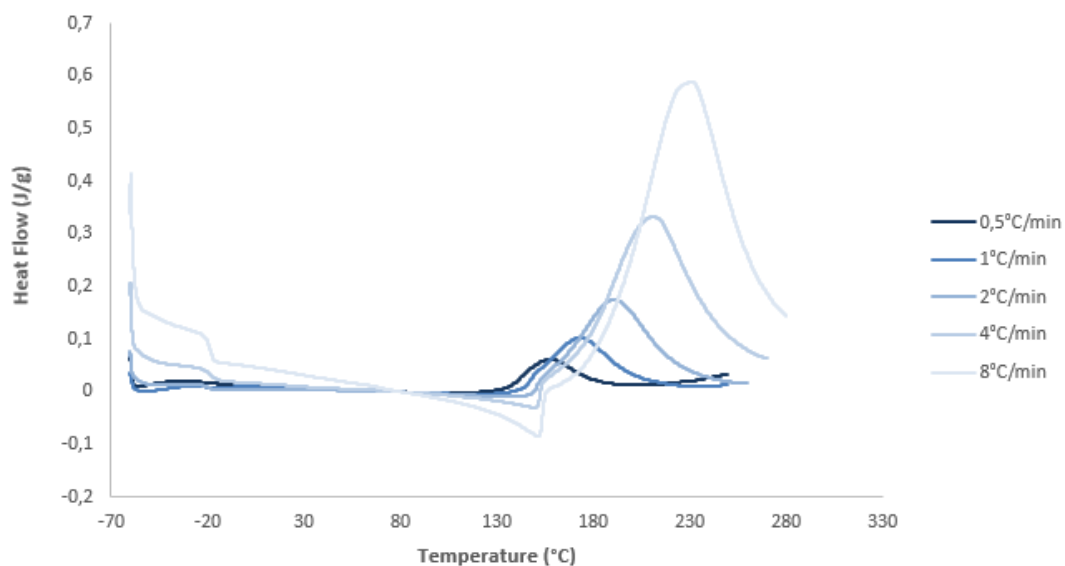


Figure 5: Standard DSC at Various Heating Rates of HexFlow[®] RTM230ST



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Processing Recommendations

Defrosting

- 24h at 23°C ± 5°C (10kg)

Process Parameters

- Preheat resin at 80°C
- Mold temperature: between 150°C and 160°C, at constant temperature
- It is critical that the resin reaches the mold temperature before entering the preform
- Injection / infusion lines: 100-120°C
- RTM Piston Pressure: atm to 5 bars

Cure Cycle

- 120 min minimum at 180°C - 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

⁽¹⁾ Dry: 24h at 105°C

⁽²⁾ Wet: 14 days in water at 70°C

Parameter (Unit)	Value		
K1c (MPa.m ^{1/2})	1,76		
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
	65	75	90
Moisture uptake (%)	1,0 – 2,0		

Compression (ASTM D695)

Conditioning	Dry ¹		Wet ²	
Test Temperature	23°C	110°C	23°C	110°C
Yield strength (MPa)	310	65	120	50
Yield strength (ksi)	45,0	9,4	17,4	7,2
Ultimate strength (MPa)	310	225	340	290
Ultimate strength (ksi)	44,9	32,7	49,8	41,8
Modulus (GPa)	3,3	2,5	3,3	2,3
Modulus (msi)	0,48	0,36	0,48	0,33

Tensile (ASTM D638)

Conditioning	Dry ¹		Wet ²	
Test Temperature	23°C	110°C	23°C	110°C
Ultimate strength (MPa)	90	45	80	20
Ultimate strength (ksi)	12,9	6,5	12,1	3,1
Modulus (GPa)	3,0	2,1	2,9	1,3
Modulus (msi)	0,44	0,30	0,42	0,19

DMA (EN6032)

T _g (°C)	Dry ¹	Wet ²
Onset	160	140
Loss Modulus	165	145
Tanδ	170	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	110 ± 5°C	23 ± 5°C	110 ± 5°C
Compression 0°	[0] ₆	Ultimate strength (MPa)	700	490	650	390
		Ultimate strength (ksi)	101,5	71,1	94,3	56,6
		Modulus (GPa)	61,9	66,0	61,4	65,5
		Modulus (msi)	9,0	9,6	8,9	9,5
Compression 90°		Ultimate strength (MPa)	675	450	600	375
		Ultimate strength (ksi)	97,9	65,3	87,0	54,4
		Modulus (GPa)	61,5	63,6	63,9	67,0
		Modulus (msi)	8,9	9,2	9,3	9,7

In plane shear IPS (EN6031)

Lay up	Property	Dry ³		Wet ⁴	
		23 ± 5°C	110 ± 5°C	23 ± 5°C	110 ± 5°C
[+45/-45] _{2S} (8 plies)	Ultimate strength (MPa)	115	80	110	70
	Ultimate strength (ksi)	16,7	11,6	15,9	10,1
	Modulus (GPa)	4,3	2,7	4,5	2,5
	Modulus (msi)	0,62	0,39	0,65	0,36

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)	420	0,65	0,4	0,016	280	40,6



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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:

from -50°C to 235°C at 2°C/min

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

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

Tensile: ASTM D638

Laminate Mechanical Data

Compression: EN2850A1**CAI:** ASTM D7136/ D7137**DMA:** EN6032

Mode: fixed frequency, simple cantilever

Amplitude: 15µm

Frequency: 1Hz

Heating rate: 3°C/min

Temperature range: from 30°C to 250°C

Tensile: EN2561B**IPS:** EN6031



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Transport and Storage of Uncured Resin

Product classification & transport conditions: Please refer to "[HexFlow[®] RTM230ST 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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