Hexcel Tooling Fabrics

HEXCEL®

Product Data Sheet

Hexcel tooling fabrics are produced from high-performance bismaleimide (BMI) resin and carbon fiber utilizing Hexcel's proprietary PrimeTex® spreading technology. PrimeTex® fabrics are inherently more uniform as the filaments in each tow are spread creating a closed fabric with lower interstitial porosity and reduced resin rich regions normally seen in other tooling fabrics. The resulting tooling surface enables quality part production with less post cure processing of finished part surfaces.

The unique combination of Hexcel's advanced tooling fabrics and Hexcel's high Tg M61 resin system create a product capable of high production rate-durable low mass carbon tools.

Benefits

- PrimeTex® fabrics have reduced resin-rich pockets resulting in higher durability and enhanced part quality
- High Tg resulting in high-rate tools for 350°F cure.
- Available in either standard modulus or intermediate modulus 3, 6 and 12K fibers
- High fiber volume fraction
- Excellent tack and drape
- Excellent out-time

Regular weaving style (left) and PrimeTex® (right) fabrics.

Uncured Prepreg Properties

Property	Value	Comment
Nominal Resin Content	38%	By Weight
Standard Fabric Areal Weights and Construction (Other AFW and styles available upon request)	196 g/m^2; 3K; Plain Weave 380 g/m^2; 6K; 8 Harness Satin 670 g/m^2; 12K; 5 Harness Satin	Available in AS4 and IM2 Fibers
Tack Life	20 days	Medium Tack
Minimum Viscosity	22.4 Poise	RDA
Out Life at 70°F (21°C)	30 days	
Storage Life	12 months after shipment	0°F

Cured Laminate Properties

Property	Value	Comment
Cured Ply Thickness 196 g/m^2 380 g/m^2 670 g/m^2	 0.0078 in (0.198 mm) 0.0150 in (0.381 mm) 0.0240 in (0.609 mm)	Based on nominal areal fiber weight.
Tg (Dry)	527°F (275°C)	DMTA, Post-Cured
Maximum Use Temperature	425°F (218°C)	Post-Cured
Coefficient of Linear Thermal Expansion	1.67 x 10^{-8}/°C	TMA
Minimum Initial Cure Temperature	375°F (191°C)	Post-Cure Required at 425°F (218°C)

Cured Physical Properties

Product Form: ACGP 380ZB; M61 (6K 280 AFW fabric)

		Condition	Value (English)	Value (SI)
Glass Transition Temperature Tg	DMTA, E'	Dry	425.0	218
		Wet FL1	325.0	163
Glass Transition Temperature Tg Enhanced Post Cure	DMTA, E'	Dry	450.0	232
		Wet FL1	350.0	177
Coefficient of Thermal Expansion (RT to 200°C, 5.56°C/min), µin/in-°F		x direction	1.383	
		y direction	1.383	
		z direction	25.217	
Hardness, Barcol	ASTM D2583	Dry	79	
Shrinkage After TA (30 inch long specimen) FL2, % change in length		Dry	-0.001	

Cured Mechanical Properties

Laminate Design (all laminates)		8 plies [0 / +45 / -45 / 90] S		
Laminate Mechanical Properties		**Condition**	**Value (English)**	**Value (SI)**
0° Flexural Strength, ksi ASTM D790	ASTM D 790	RTA	119.18	821.9
		375°F	83.51	575.7
		RTA / TA FL1	110.56	762.6
		375° / TA FL1	90.72	625.4
0° Flexural Modulus (1000-3000 με MSI ASTM D790	ASTM D 790	RTA	6.92	47.7
		375°F	6.55	45.2
		RTA / TA FL1	7.02	48.4
		375° / TA FL1	7.04	4.5
Open Hole Compression Strength, ksi ASTM D6484	ASTM D6484	RTA	45.85	316
		375°F	32.55	224
		RTA / TA FL1	47.37	327
		375° / TA FL1	38.39	265
Compression After Impact, ksi ASTM D7316/D7317	ASTM D7316/ D7317	RTA	37.56	259
		RTA / TA FL1	37.38	258
0° Short Beam Shear Strength, ksi ASTM D2344	ASTM D2344	RTA	12.18	84
		RTA / 60 Day Out Time	11.74	80.9

FL1 Wet condition 72 hour water boil

FL2 TA = Thermal Aging for 200 cycles

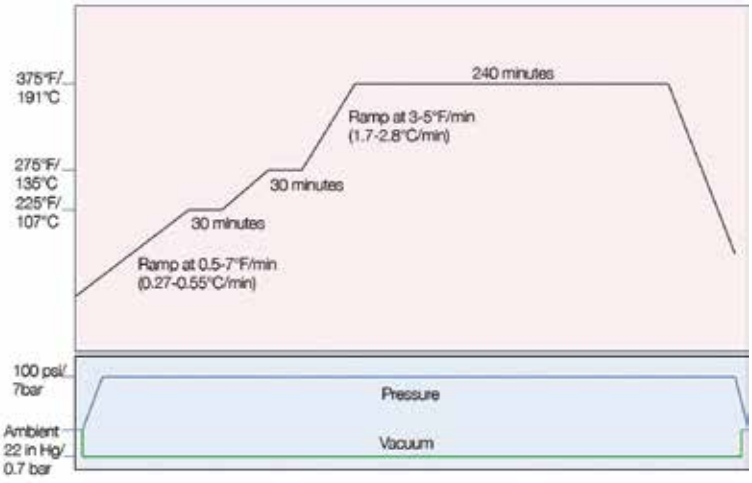
Cycle is 140°F to 375°F at no greater than 5°F/min, hold at 375°F for 2 hours, cool down to 140°F at no greater than 5°F/min

Cure Cycle

Establish a minimum vacuum of 22 inHg (0.7 bar). Maximum allowed vacuum bag leak is 2 inHg (0.067 bar) in 10 minutes.

- Begin heating at 0.5-1°F/minute (0.27-0.55°C/minute) to 225°F (107°C).
- Increase pressure to 100±10 psi (6.89±0.69 bar).
- Dwell at 225±5°F (107±2.8°C) based on lagging thermocouple for 30+10/-0 minutes.
- Continue to heat 0.5-1°F/minute (0.27-0.55°C/minute) to 275°F (135°C).
- Dwell at 275±5°F (135±2.8°C) based on lagging thermocouple for 30+10 /-0 minutes.

Hexcel Tooling Fabrics Cure Cycle

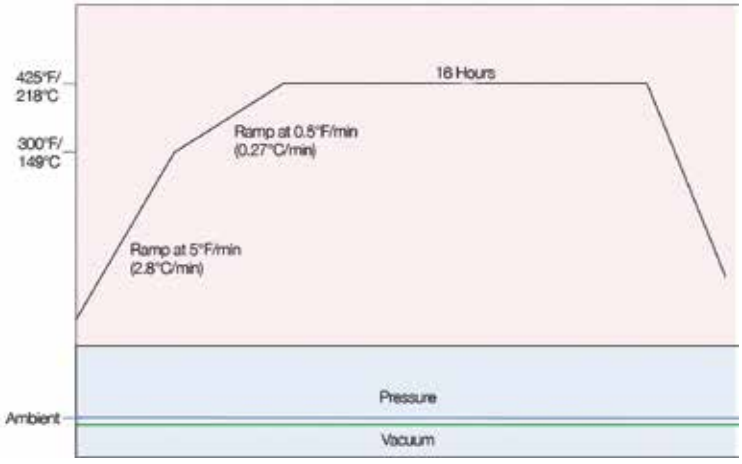


- Continue to heat at 3-5°F/minute (1.7-2.8°C/minute) to 375°F (191°C).
- Dwell at 375±5°F (191±2.8°C) based on lagging thermocouple for 240 +30 /-0 minutes.
- Cool at a maximum of 5°F/minute (2.3°C/minute) to 120°F (49°C) before releasing pressure.

Post-Cure Cycle

- Begin heating the tool at a maximum of 5 °F/minute (2.8 °C/minute) to 300°F (149°C).
- When leading thermocouple reaches 300°F±5°F (149°C±2.8°C) reduce ramp rate to a maximum of 0.5 °F/minute (0.27 °C/minute) and continue heating to (218°C) 425°F.
- Cool at a maximum rate of 5 °F/minute (2.8 °C/minute) to 150°F (65°C) before removing from the oven.
- Allowed to open door at 240°F (116°C) based on a lagging TC to assist with cool down.

Hexcel Tooling Fabrics Post-Cure Cycle



Storage and Handling

Store the product with the roll core sitting horizontally and support at core ends in its original (or equivalent) sealed packaging at 0°F (-18°C). Prevent condensation on the product by warming to room temperature before opening vapor barrier bag (reseal for subsequent storage). The usual precautions when handling uncured synthetic resins and fine fibrous materials should be observed. See Material Safety Data Sheet. The use of clean disposable impervious gloves provides protection for the operator and avoids contamination of material and components.

Safety Information

Obtain, read, and understand the Material Safety Data Sheet (MSDS) before use of this product.

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
- Redux® adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products

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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