HexPly® M65

toughened bismaleimide resin for advanced composites

HEXCEL®

Product Data Sheet

Description

HexPly® M65 is a bismaleimide resin that cures via an addition reaction in a toughened two-phase thermoset matrix with no condensation by-products. HexPly® M65 is a controlled bimaleimide resin system designed for alternative processing capabilities such as co-curing over honeycomb core, compression molding, as well as standard autoclave processing. HexPly® M65 has improved tack levels and performs well for fiber placement applications.

Features

Uncured

- Controlled flow
- Process working life greater than 20 days
- Enhanced tack
- Good for fiber placement applications
- Good tack life to 10 days

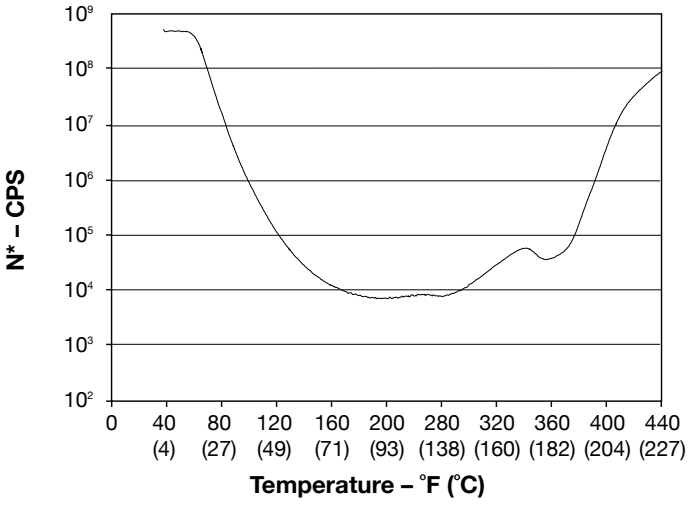
Cured

- High laminate mechanical strengths and strains
- High strength retention at 450°F (232°C) dry and 350°F (177°C) wet
- Improved compression after impact properties
- Void-free thick laminate processability
- Void-free thick laminate co-cure processing over honeycomb core
- Long-term service life to 400°F (204°C)
- Excellent electrical properties

Neat Resin Properties

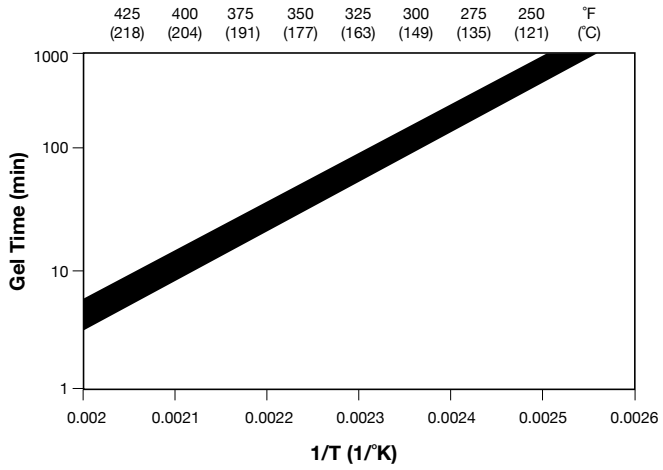
Specific Gravity	1.246
T_g dry*	572°F (300°C)
T_g wet*	437°F (225°C)
Equilibrium Moisture Absorption	3.8%
Fracture Toughness, K_{1C}	880 psi - $in^{1/2}$ (0.967 MPa - $m^{1/2}$)

Dynamic Viscosity Analysis



* Test method: DMTA, **E"** peak

M65 Matrix Gel Times



Cure Procedure

Thin Laminates: ≤ 0.50 in (1.27 cm)

A. Apply vacuum of 22 inches Hg (74 kPa) minimum. Apply 85 ± 5 psig (586 kPa) and vent bag.
B. Heat to 375°F at 2–4°F/minute (191°C at 1.2–2.4°C/minute); cure 4 hours.
C. Cool to 150°F at 5°F/minute (66°C at 3°C/minute) before releasing pressure.

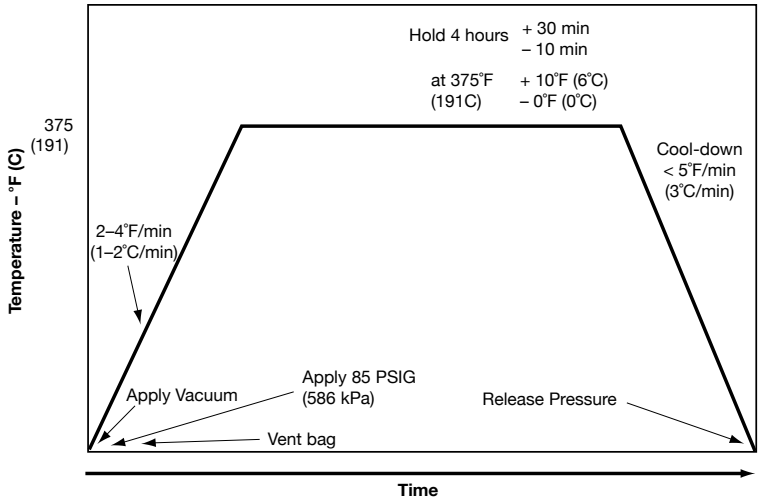
Thick Laminates: > 0.50 in (1.27 cm)

Laminates may be cured with modified cure cycle.

Postcure Procedure

- Postcure 16 hours at 450°F (232°C) (free-standing oven).
- Raise temperature from ambient to 375°F at a rate of 5–10°F/minute (191°C at a rate of 3–6°C/minute) and at a rate of 1–2°F/minute (0.6–1.2°C/minute) above 375°F (191°C).

Note: Alternate postcure cycle: 6 hrs at 470°F (243°C) using same rates as standard.



Availability

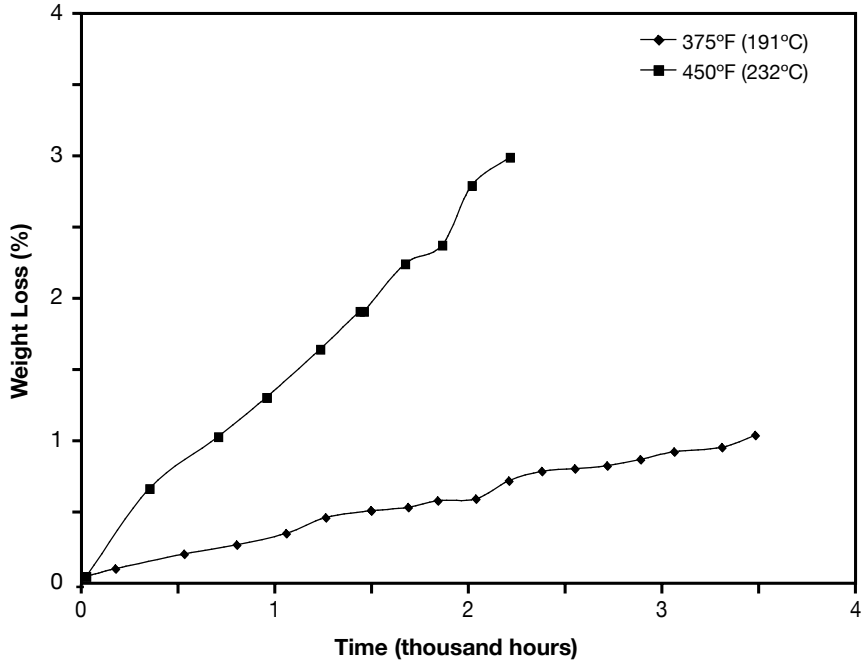
Form	Hexcel Designation	Fiber	Fiber Areal Wt. g/m2	Weave	Count Warp x Fill	Widths Available in (cm)
Carbon Tape	IM7G 12K/M65	IM7–12K	145	n/a		0.125 in–24 in (0.3175–60.96 cm)
Carbon Fabrics	T300 3K PW/M65 Plain Weave	T300–3K	194	Plain	12.5 x 12.5	42 in (106.68 cm)
	AS4C 3K PW/M65 Plain Weave	AS4C-3K	194	Plain	12.5 x 12.5	42 in (106.68 cm)

Note: Carbon tapes may be produced with various carbon fiber types and tow sizes. In designating tape, the second digit represents tow size and the third digit represents fiber source. Consult your nearest Hexcel Sales Representative for additional information.

Physical Properties

	Property	Carbon Tape	Carbon Fabric
Prepreg	Material description	IM7G 12K/M65	T300 3K PW/M65
	% Volatile content	< 2	< 2
	% Resin content (dry)	33	40
Laminate	Cured thickness per ply in (cm)	0.0054 in (0.0137 cm)	0.0083 in (0.0212 cm)
	% Fiber volume	59%	51%
	Density (g/cm2)	1.56	1.52

Isothermal Aging – Weight Loss (in air)
T300 3K PW Fabric



Properties	Carbon Fabric - Plain Weave					
	T300			AS4C		
	RT (AMB)	450°F (AMB) (232°C)	350°F(W) (177°C)	RT (AMB)	450°F (232°C)	350°F(W) (177°C)
Fill Tension						
Strength: ksi (MPa)	108 (744)	–	–	122 (841)	–	–
Modulus: msi (GPa)	8.18 (56.3)	–	–	8.10 (55.8)	–	–
Fill Compression						
Strength: ksi (MPa)	129 (889)	74 (510)	63.5 (438)	114 (786)	77 (531)	59.2 (408)
Modulus: msi (GPa)	8.4 (57.9)	–	8.18 (56.3)	–	–	–
Fill Short Beam Shear						
Strength: ksi (MPa)	14.9 (103)	7.9 (54)	5.6 (39)	9.9 (68)	7.3 (50)	5.0 (34)
In Plane Shear						
Strength: ksi (MPa)	17.5 (120)	10.2 (70)	11.5 (79)	19.3 (133)	9.7 (67	10.15 (70)
Modulus: msi (GPa)	0.656 (4.5)	0.394 (2.7)	0.198 (1.4)	0.659 (4.5)	0.398 (2.7)	0.232 (1.6)
Flexure (fill)						
Strength: ksi (MPa)	133 (917)	110 (758)	80.1 (552)	151 (1041)	103 (710)	75.4 (520)
Modulus: msi (GPa)	8.25 (56.8)	7.86 (54)	7.44 (51.3)	8.33 (57)	7.88 (54)	7.55 (52)

W = wet

Laminate Mechanical Properties

Properties	Carbon Tapes IM7 (12K)		
	RT	450°F (232°C)	350°F(W) (177°C)
Tension $(90°, 0°)_{2S}$			
Strength: ksi (MPa)	229 (1579)		
Modulus: msi (GPa)	12.39 (85.4)		
Strain: %	1.73		
Compression $(90°, 0°)_{2S}$			
Strength: ksi (MPa)	179 (1234)	152 (1048)	101 (696)
Flexure $(0°, 90°)_{5S}$			
Strength: ksi (MPa)	170 (1172)	136 (938)	110 (758)
Modulus: msi (GPa)	13.73 (94.7)	13.44 (92.7)	13.16 (90.7)
Short Beam Shear $(0°, 90°)_{5S}$			
Strength: ksi (MPa)	11.74 (80.9)	8.51 (58.7)	5.95 (41.0)
In Plane Shear $(\pm 45°)_{2S}$			
Strength: ksi (MPa)	18.8 (129)	11.9 (82)	10.4 (72)
Modulus: msi (GPa)	0.68 (4.7)	0.443 (3.1)	0.3 (2.1)
Compression After Impact $(45°, 90°, -45°, 0°)_{4S}$			
Impact energy 1500 in-lb, class 2*			
Strength: ksi (MPa)	26.3 (181)		

Storage

HexPly® M65 prepreg should be sealed in a polyethylene bag and refrigerated, preferably below 32°F (0°C). Following removal from refrigerated storage, allow the prepreg to reach room temperature before opening the polyethylene bag to avoid moisture condensation. Shelf life: 12 months at 0°F (–18°C), 6 months at 40°F (4°C) *(maximum, from date of manufacture).*

Shipping

Prepreg fabric and tape are generally shipped in sealed polyethylene bags in insulated containers packed with dry ice.

Disposal of Scrap

Disposal of this material should be in a secure landfill in accordance with state and federal regulations.

Handling and Safety Precautions

Hexcel recommends that customers observe established precautions for handling polyimide resins and fine fibrous materials. Operators working with this product should wear clean, impervious gloves to reduce the possibility of skin contact and to prevent contamination of the material.

Airborne graphite as a result of sawing, grinding, etc., can present electrical shorting hazards; refer to NASA Technical Memorandum 78652. Safety Data Sheets (SDS) have been prepared for all Hexcel products and are available to company safety officers on request from your nearest Hexcel Sales Office.

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®-i molding compounds
- HexFlow® RTM resins
- HexBond™ adhesives
- HexTool® tooling materials
- HexWeb® honeycombs
- Acousti-Cap® sound attenuating honeycomb
- Engineered core
- Engineered products
- Polyspeed® laminates & pultruded profiles
- HexAM® additive manufacturing

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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