HexPly® F185™
resin systems for advanced composites

HEXCEL®

Product Data Sheet

Description
HexPly® F185™ is an advanced epoxy formulation designed for autoclave curing to offer very high sandwich and metal bonding strengths with moderate laminate strengths. HexPly® F185™ is a structural adhesive and co-curing grade epoxy resin with a 250°F (121°C) cure. This system offers the highest available fracture toughness and strain to failure of the 250°F (121°C) cure resins.

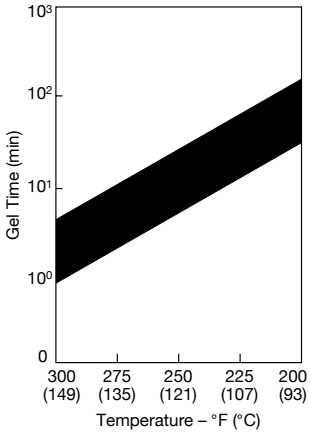
Features
Uncured
- Single assembly sandwich layup procedure
- Controlled flow
- Excellent tack and drape properties

Cured
- Excellent fracture toughness and strain to failure
- Self-extinguishing
- Balanced tool and bagside peels on sandwich panels
- Very high sandwich and metal bonding strengths
- Good laminate properties

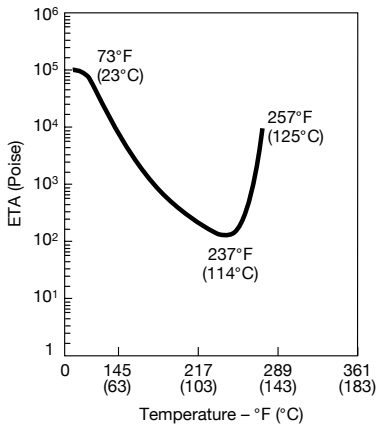
Neat Resin Properties

Specific gravity	1.286
T_g dry	171°F (77°C)
Equilibrium moisture absorption	7.0%
Linear coefficient of thermal expansion	4.75 x 10–5 in/in/°F (8.55 x 10–5 cm/cm/°C)
Tensile strength	7.2 ksi (50 MPa)
Tensile modulus	0.42 msi (2.9 GPa)
Tensile strain	> 9.5%
Fracture toughness, K_{1C}	4.05 ksi $\sqrt{in}$ (3.69 MPa $\sqrt{m}$)
Strain energy release rate, G_{1C}	34.5 in-lb/in^2 (6.04 kJ/m^2)
Gel time at 250°F (121°C)	5–11 min

Gel Time vs Temperature



Rheometrics Curve of F185
4°F (2°C)/min, 10 rad/sec, RDS-7700, 50 mm Plates



Availability

Form	Hexcel Designation	Fiber	Fiber Areal Wt. g/m²	Weave	Count Warp x Fill	Available Widths Standard Width, in (cm)
Glass Fabrics	120-38”-F185	450-1/2	115	Crowfoot MIL-C-9084 TYIII	60 x 58	38”, 50”, 60” (96.5, 127, 152.4)
	1581-38"-F185	150-1/2	303	8 Harness Satin MIL-C-9084 TYVIIIA	57 x 54	38”, 50”, 60”, 72” (96.5, 127, 152.4, 182.9)
	7781-38”-F185	75-1/0	303	8 Harness Satin MIL-C-9084 TYVIIIB	57 x 54	38”, 50”, 60”, 72” (96.5, 127, 152.4, 182.9)
Kevlar® Fabrics	K120-38”-F185	Kev. 49 195	61	Plain	34 x 34	38”, 50”, 60” (96.5, 127, 152.4)
	K285-38”-F185	Kev. 49 1140	170	Crowfoot	17 x 17	38”, 50”, 60” (96.5, 127, 152.4)
	K281-38”-F185	Kev. 49 1140	170	Plain	17 x 17	38”, 50”, 60” (96.5, 127, 152.4)

Note: Alternatively, glass and Kevlar® fabric weaving may be used with the HexPly® F185™ Resin System. Consult your nearest Hexcel Sales Representative for additional information.

Physical Properties

	Property	Glass Fabrics			Kevlar® Fabric
Prepreg	Material description	120	1581	7781	K285
	% Flow at 250°F, 40 psi (121°C, 276 kPa)	24-34	24-34	24-34	24-34
	% Volatiles	0.4-1.2	0.4-1.2	0.4-1.2	0.4-1.2
	% Resin content (wet)	57-63	47-53	47-53	52-58
Laminate	Cured thickness per ply – in (cm)	0.0049 (0.012)	0.0092 (0.023)	0.0082 (0.021)	0.0110 (0.028)
	% Fiber volume	36.1	51.3	56.0	42.0

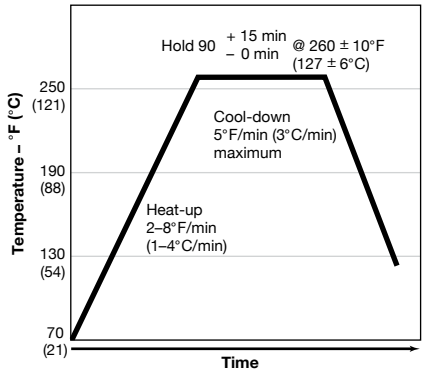
Mechanical Properties

	Property	Temp °F (°C)	Glass Fabrics			Kevlar Fabric
			120	1581	7781	285
Laminate Properties	Warp tensile strength, ksi (MPa)	75 (24)	44.7 (308)	55.0 (379)	63.8 (440)	73.6 (507)
	Warp tensile modulus, msi (GPa)	75 (24)				3.48 (24.0)
	Fill tensile strength, ksi (MPa)	75 (24)				60.8 (419)
	Fill tensile modulus, msi (GPa)	75 (24)				3.81 (26.3)
	Warp compression strength, ksi (MPa)	75 (24)	41.0 (283)	50.0 (345)	47.0 (324)	22.5 (155)
	Warp compression modulus, msi (GPa)	75 (24)				2.79 (19.3)
	Fill compression strength, ksi (MPa)	75 (24)				23.8 (164)
	Fill compression modulus, msi (GPa)	75 (24)				2.00 (13.8)
	Warp short beam shear, ksi (MPa)	75 (24)				5.27 (36)
Sandwich Panel Properties	Drum peel, in-lb/in (m–kg/m)	–65 (–54)	15.0 (6.8)	23.3 (10.6)	26.0 (11.8)	
	Drum peel, in-lb/in (m–kg/m)	75 (24)	23.0 (10.5)	29.4 (13.4)	36.6 (16.6)	17.6 (8)
	Drum peel, in-lb/in (m–kg/m)	180 (82)	20.5 (9.3)	31.2 (14.2)	35.0 (15.9)	
	Flatwise tensile, psi (kPa)	–65 (–54)		1223 (8432)		
	Flatwise tensile, psi (kPa)	75 (24)		803 (5537)		
	Flatwise tensile, psi (kPa)	180 (82)		403 (2779)		
	Long beam flex, lb (kg)	75 (24)				280 (127.3
Adhesive Properties	Lap shear, psi (kPa)	–65 (–54)	4967 (34246)	5378 (37080)	4748 (32737)	
	Lap shear, psi (kPa)	75 (24)	5139 (35432)	4609 (31778)	4606 (31757)	
	Lap shear, psi (kPa)	180 (82)	3869 (26676)	4123 (28427)	2941 (20278)	
	Metal-to-metal peel, lb/in (kN/m)	–65 (–54)	39.6 (6.95)	47.0 (8.24)	32.2 (5.65)	
	Metal-to-metal peel, lb/in (kN/m)	75 (24)	49.7 (8.72)	73.0 (12.8)	76.4 (13.4)	
	Metal-to-metal peel, lb/in (kN/m)	180 (82)	59.1 (10.4)	63.2 (11.1)	76.4 (13.4)	

All mechanical property values are based on the calculated fiber volume found on the previous table.

Reported property values are averages to which no statistical assurance should be associated. While Hexcel believes that the data contained herein are factual, the data are not to be taken as a warranty or representation for which Hexcel assumes legal responsibility. They are offered solely for your consideration, investigation, and verification.

Cure Cycle



Cure Procedure

A. Apply vacuum of 22 inches (74 kPa) Hg minimum.

B. Apply 85 + 15 – 0 psig (586 + 103 – 0 kPa) pressure for laminates.

C. Apply 45 + 15 – 0 psig (310 + 103 – 0 kPa) pressure for sandwich.*

D. Vent vacuum bag to atmosphere when pressure reaches 20 psi (138 kPa).

E. During cool-down when the part temperature falls below 140°F (60°C), pressure can be relieved and the test panel removed from the autoclave and debagged.

** Typical for HRH® 10–1/8–3.0 honeycomb.*

Storage

HexPly® F185™ 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: 6 months at 0°F (–18°C), 3 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 epoxy 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

FTU 337 AG17