



HexPly® F185™

Resin Systems for Advanced Composites

Product Data

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

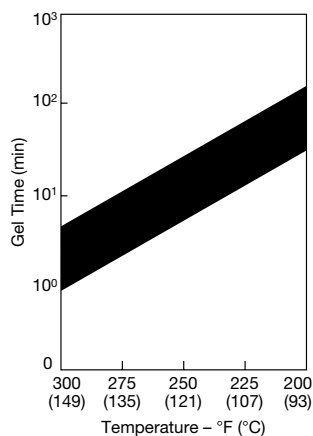
Cured

- 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
- Certified to MIL-A-25463 A, Type 1, Class 2, and MMM-A-132 A, Type 1, Class 2

Neat Resin Properties

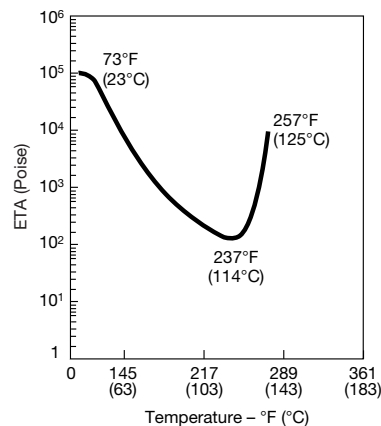
Specific gravity	1.286
T _g dry	171°F (77°C)
Equilibrium moisture absorption	7.0%
Linear coefficient of thermal expansion	4.75 x 10 ⁻⁵ in/in/°F (8.55 x 10 ⁻⁵ cm/cm/°C)
Tensile strength	7.2 ksi (50 MPa)
Tensile modulus	0.42 msi (2.9 GPa)
Tensile strain	> 9.5%
Fracture toughness, K _{1C}	4.05 ksi √in (3.69 MPa √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



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HexPly® F185™ Product Data

Availability

Form	Hexcel Designation	Fiber	Fiber Areal Wt. g/m ²	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 TYVIII	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 TYVIII	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
		120	1581	7781	K285
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	.4-1.2	.4-1.2	.4-1.2	.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

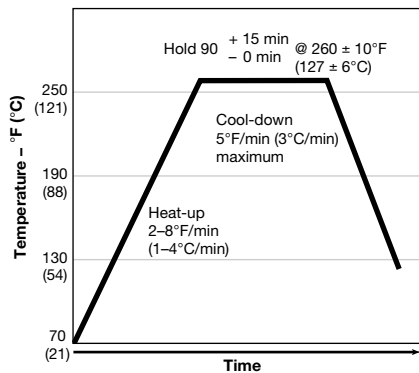
Property	Temp °F (°C)	Glass Fabrics			Kevlar Fabric
		120	1581	7781	285
Laminate Properties					
Warp tensile strength, ksi (MPa)	75 (24)	44.7 (308)	55.0 (379)	63.8 (440)	73.6 (507)
Warp tensile modulus, msi (GPa)	75 (24)				3.48 (24.0)
Fill tensile strength, ksi (MPa)	75 (24)				60.8 (419)
Fill tensile 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)	17.6 (8)
Drum peel, in-lb/in (m–kg/m)	75 (24)	23.0 (10.5)	29.4 (13.4)	36.6 (16.6)	
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)		280 (127.3)
Flatwise tensile, psi (kPa)	75 (24)		803 (5537)		
Flatwise tensile, psi (kPa)	180 (82)		403 (2779)		
Long beam flex, lb (kg)	75 (24)				
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

- Apply vacuum of 22 inches (74 kPa) Hg minimum.
- Apply 85 + 15 – 0 psig (586 + 103 – 0 kPa) pressure for laminates.
- Apply 45 + 15 – 0 psig (310 + 103 – 0 kPa) pressure for sandwich.*
- Vent vacuum bag to atmosphere when pressure reaches 20 psi (138 kPa).
- 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).

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. Material Safety Data Sheets (MSDS) have been prepared for all Hexcel products and are available to company safety officers on request from your nearest Hexcel Sales Office.

Important

Hexcel Corporation believes, in good faith, that the technical data and other information provided herein is materially accurate as of the date this document is prepared. Hexcel reserves the right to modify such information at any time. The performance values in this data sheet are considered representative but do not and should not constitute specification minima. The only obligations of Hexcel, including warranties, if any, will be set forth in a contract signed by Hexcel or in Hexcel's then current standard Terms and Conditions of Sale as set forth on the back of Hexcel's Order Acknowledgement.

For more Information

Hexcel is a leading worldwide supplier of composite materials to aerospace and other demanding industries. Our comprehensive product range includes:

- Carbon Fiber
- RTM Materials
- Honeycomb Cores
- Continuous Fiber Reinforced Thermoplastics
- Carbon, Glass, Aramid and Hybrid Prepregs
- Structural Film Adhesives
- Honeycomb Sandwich Panels
- Special Process Honeycombs
- Reinforced Fabrics

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 click here: <http://www.hexcel.com/contact/salesoffices>.