



HexPly® F584™

Resin Systems for Advanced Composites

Product Data

Description

HexPly® F584™ is a modified epoxy resin combined with novel proprietary converters to give maximum elongation on high strain carbon fibers while retaining a wet service capability of 200°F (93°C). This system offers greater toughness and impact resistance than conventional 350°F (177°C) cure epoxy thermoset resins.

Features

Uncured

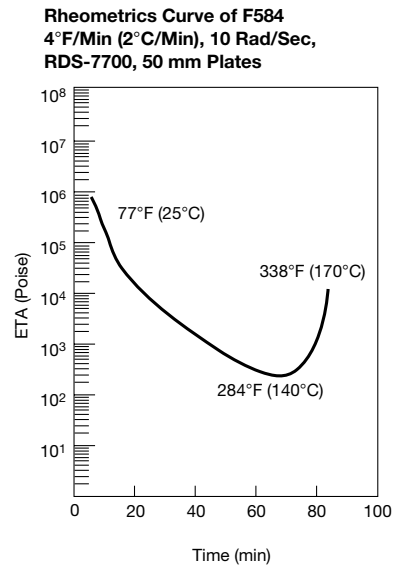
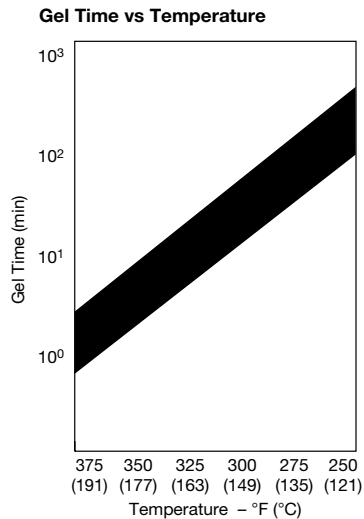
- Intermediate Flow
- Good Shelf Life
- Curable at 300°F (149°C) and 350°F (177°C)
- Excellent Pressure Sensitive Tack Lends Itself to Automated Tape Laying Applications

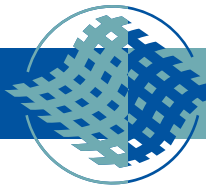
Cured

- Excellent Tensile Translation With High Strain Graphite Fibers
- Medium Toughness and Impact Resistance for 350°F (177°C) Cure System
- Wet Service Capability up to 200°F (93°C)

Neat Resin Properties

Specific gravity	1.219
T _g dry (RDS)	340°F (171°C)
T _g wet (RDS)	250°F (121°C)
Tensile strength	10.6 ksi (73 MPa)
Tensile modulus	0.60 msi (4.14 GPa)
Tensile strain	1.8%
Fracture toughness, K _{1C}	0.82 ksi √in (0.90 MPa √m)
Strain energy release rate, G _{1C}	1.0 in-lb/in ² (0.175 kJ/m ²)
Poisson's ratio	0.35
Gel time at 350°F (177°C)	2–8 min
Gel time at 300°F (149°C)	19–25 min





Mechanical Properties¹

Property	Temp °F (°C)	Condition	Carbon Fabrics	Carbon Tapes 145AW		Kevlar Fabric	Fiberglass Fabric
			W4G282	T650	IM7	285 Style	181 Style
Tensile strength, ksi (MPa)	75 (24)	Dry	140	339	406	66 (455)	55
Tensile modulus, msi (GPa)	75 (24)	Dry	11.0	22.7	22.1	4.1	3.3
Tensile strain, %	75 (24)	Dry	1.27	–	1.68	1.58	1.68
Tensile strength, ksi (MPa)	200 (93)	Dry	141	316	367	64.7	39
Tensile modulus, msi (GPa)	200 (93)	Dry	10.7	22.1	19.5	3.6	3.0
Tensile strain, %	200 (93)	Dry	1.33	1.44	1.72	1.82	1.32
Open hole tensile strength, ksi (MPa)	75 (24)	Dry	65	74	79	34 (193)	30
Compression strength, ksi (MPa)	75 (24)	Dry	131	230	240	41 (283)	80
Compression modulus, msi (GPa)	75 (24)	Dry	9.9	19.5	22.6	3.6	3.7
Compression strength, ksi (MPa)	200 (93)	Dry	120	229	198	–	–
Compression modulus, msi (GPa)	200 (93)	Dry	10.0	21.2	24.0	–	–
Compression strength, ksi (MPa)	200 (93)	Wet ²	112	198	175	22 (152)	53
Compression modulus, msi (GPa)	200 (93)	Wet ²	10.1	20.1	23.2	3.6	3.5
Short beam shear strength, ksi (MPa)	75 (24)	Dry	12.5	17.2	18.9	–	–
Short beam shear strength, ksi (MPa)	200 (93)	Dry	10.0	13.1	15.1	–	–
Short beam shear strength, ksi (MPa)	200 (93)	Wet ²	7.9	10.0	12.0	–	–
Bearing strength, ksi (MPa)	75 (24)	Dry	145 ³	147 ⁴	–	94 ³ (621)	94 ³
Sandwich flatwise tension, psi (kPa)	75 (24)	Dry	600 ⁵	–	–	–	–
Sandwich long beam bending, ksi (MPa)	75 (24)	Dry	55 ⁵	–	–	–	–
Compression after impact strength, ksi ⁶ (MPa)	75 (24)	Dry	41 ⁷	34 ⁸	30.0 ⁸	18 ⁷ (124)	32 ⁷

¹ All mechanical property values except short beam shear strength were normalized to 60% fiber volume.

² Wet is 30 days of humidity conditioning at 160°F (71°C) and 95% relative humidity.

³ [(0°/90°), (±45°)]_{2s}

⁴ [0°, +45°, 90°, -45°]_{2s}

⁵ [(0°/90°), (±45°)]

⁶ The energy of impact was 960 in-lb/in.

⁷ [(0°/90°), (±45°)]_{6s}

⁸ [0°, +45°, 90°, -45°]_{6s}

Availability

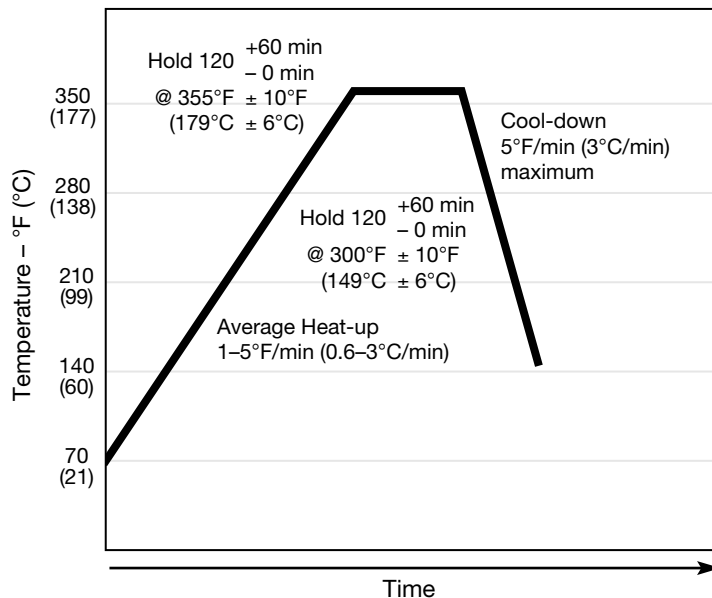
Form	Hexcel Designation	Fiber	Fiber Areal Wt. g/m ²	Weave	Count Warp x Fill	Available Widths Standard Width (cm)
Carbon Fabrics	W4G282-42"-F584	Amoco T650/35-3K	193	Plain	12.5 x 12.5	42", 60" (106.7, 152.4)
	F4G433-42"-F584	Amoco T650/35-3K	280	5 Harness Satin	17.5 x 17.5	42", 60" (106.7, 152.4)
	F4G584-42"-F584	Amoco T650/35-3K	370	8 Harness Satin	24 x 24	42", 60" (106.7, 152.4)
Carbon Tape	T7G145-12"-F584	Amoco T650/35-12K	145	n/a	n/a	12", 3"-24" (30.5, 7.6-61)
	T9A145-12"-F584	Hercules IM7 - 12K	145	n/a	n/a	12", 3"-24" (30.5, 7.6-61)

Note: HexPly® F584™ carbon tapes and fabrics may be produced with various carbon fiber types and tow sizes. In designating tapes and fabrics, the second digit represents the tow size and the third digit represents the fiber source. The areal weights of the tapes are typically: 95, 145, or 190 g/m². Consult your nearest Hexcel representative for additional information.

Physical Properties

Prepreg	Property	Carbon Fabrics			Carbon Tapes		
	Material description	W4G282	F4G433	F4G584	95 g/m ²	145 g/m ²	190 g/m ²
	% Resin content (dry)	39-43	37-43	37-43	35-39	35-39	35-39
	% Volatiles at 350°F (177°C)	1-4	1-4	1-4	1-4	1-4	1-4
	% Flow at 350°F, 50 psi (177°C, 345 kPa)	5-15	5-15	5-15	5-15	5-15	5-15
Laminate	Nominal cured thickness per ply - in (cm)	0.0072 (0.018)	0.0115 (0.029)	0.0150 (0.038)	0.0039 (0.010)	0.0059 (0.015)	0.0078 (0.020)
	% Fiber volume	55	55	55	55	55	55

Cure Cycle





Cure Procedure

I. Thin Laminate [under 0.25" (0.32 cm) thick]

- A. Apply vacuum of 22 in (74 kPa) Hg minimum.
- B. Apply 45 to 100 psi (310 to 689 kPa) autoclave pressure at ambient temperature, then vent vacuum when pressure reaches 20 psi (138 kPa).
- C. Raise temperature to 355°F (179°C) at 1–5°F (0.6–3°C) per minute and hold for 120 minutes.
- D. Cool to 150°F (66°C) at a maximum rate of 5°F (3°C) per minute before releasing pressure.

Storage

HexPly® F584™ 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 Fibre
- 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 EU 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>.