

HexPly® F155

Resin Systems for Advanced Composites

Product Data

Description

HexPly® F155 is an advanced modified epoxy formulation designed for autoclave curing to offer very high laminate strengths, coupled with increased fracture toughness and adhesive properties. HexPly® F155 is a controlled flow epoxy resin for lamination and co-curing at 250°F (121°C) cure. HexPly® F155 will pass MIL-R-9300, co-cure as a honeycomb facing, and bond metal to metal.

Features

Uncured

- Controlled Flow in the Basic Formulation to Offer Balanced Tool and Bagside Sandwich Peels
- Good Tack and Drape Properties for Layup and Assembly Purposes
- Can Be Adapted for Use on Various Weaves and Fiber Reinforcements
- Long Out Time

Cured

- High Laminate Strengths
- Good Sandwich Panel and Metal-to-Metal Bonding
- Self-Extinguishing Properties
- Certified to MIL-R-9300, Type 1, Grade O, Form B

Neat Resin Properties

Specific gravity

T_g dry

Equilibrium moisture absorption

Linear coefficient of thermal expansion

Tensile strength

Tensile modulus

Tensile strain

Fracture toughness, K_{IC}

Strain energy release rate, G_{IC}

Gel time @ 250°F (121°C)

1.335

250°F (121°C)

9.4%

2.93×10^{-6} in/in/°F (5.27×10^{-6} cm/cm/°C)

11.6 ksi (80 MPa)

0.47 msi (3.24 GPa)

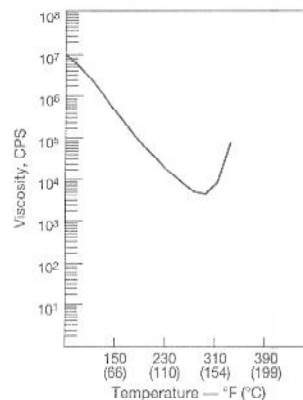
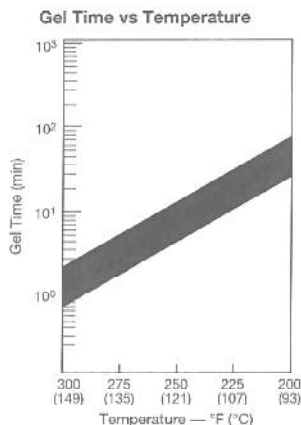
5.2%

1.50 ksi $\sqrt{\text{in}}$ (1.65 MPa $\sqrt{\text{m}}$)

4.18 in-lb/in² (0.73 kJ/m²)

4–10 min

Rheometrics Curve of F155 Resin
4°F (2°C)/min, 10 rad/sec,
RDS-7700, 50 mm Plates



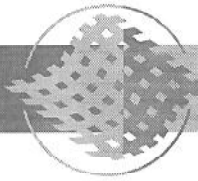
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HexPly® F155™ Product Data

Availability

Form	Hexcel Designation	Fiber	Fiber Areal Wt. g/m ²	Weave	Count Warp x Fill	Widths Available Standard Width, in (cm)
Carbon Fabrics	W3T282-42"-F155 W3C282-42"-F155	T300 Toho®	194	Plain	12.5 x 12.5	<u>42"</u> , 60" (106.7, 152.4)
	F3T584-42"-F155 F3C584-42"-F155	T300 Toho	370	8 Harness Satin	24 x 24	<u>42"</u> , 60" (106.7, 152.4)
Glass Fabrics	120-38"-F155	450-1/2	115	Crowfoot MIL-C-9084 TYIII	60 x 58	<u>38"</u> , 50", 60" (96.5, 127, 152.4)
	1581-38"-F155	150-1/2	303	8 Harness Satin MIL-C-9084 TYVIII A	57 x 54	<u>38"</u> , 50", 60", 72" (96.5, 127, 152.4, 182.9)
	7781-38"-F155	75-1/0	303	8 Harness Satin MIL-C-9084 TYVIII B	57 x 54	<u>38"</u> , 50", 60", 72" (96.5, 127, 152.4, 182.9)
Kevlar® Fabrics	K120-38"-F155	Kev. 49 195	61	Plain	34 x 34	<u>38"</u> , 50", 60" (96.5, 127, 152.4)
	K285-38"-F155	Kev. 49 1140	170	Crowfoot	17 x 17	<u>38"</u> , 50", 60" (96.5, 127, 152.4)
	K281-38"-F155	Kev. 49 1140	170	Plain	17 x 17	<u>38"</u> , 50", 60" (96.5, 127, 152.4)
Carbon Tapes	TXX095-12"-F155	Various	95	n/a	n/a	<u>12"</u> , 3"-24" (30.5, 7.6-61)
	TXX145-12"-F155	Various	145			
	TXX190-12"-F155	Various	190			
Glass Tape	T2E285-12"-F155	E-Glass 1062	285			
Kevlar Tape	T7D150-12"-F155	Kev. 49 7100	150			

Note: Alternate carbon, glass, and Kevlar weaves may be used with the HexPly® F155 Resin System. Also, HexPly® F155 carbon tapes may be produced with various carbon fiber types and tow sizes. In designating carbon tape, the second digit represents tow size and the third digit represents fiber source. Contact the nearest Hexcel Sales Office for additional information.

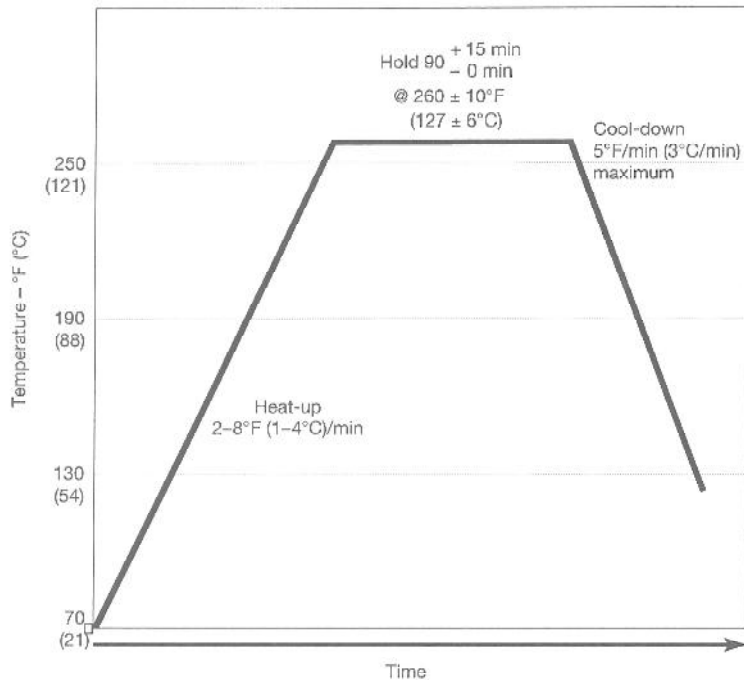
Mechanical Properties cont.

Property	Temp.	Kevlar 49 Fabrics		Glass Fabrics			Carbon Tapes			Carbon Fabric
		120	285	120	220	181	T3T095	T2C145	T2C190	W3T282
Compression strength, ksi (MPa)	75 (24)	32.0 (221)	37.9 (261)	64.4 (444)	71.9 (496)	75 (517)	168 (1158)	193 (1331)	170 (1172)	131 (904)
Compression modulus, msi (GPa)	75 (24)	3.9 (26.9)	3.4 (23.4)	3.0 (20.7)	3.2 (22.1)	3.7 (25.5)	15.9 (109.6)	—	—	8.3 (57.2)
Compression strength, ksi (MPa)	160 (71)	24 (165)	28.3 (195)	—	57.4 (376)	58 (400)	134 (924)	170 (1172)	140 (965)	72.0 (496)
Compression modulus, msi (GPa)	160 (71)	3.0 (21)	3.4 (23.4)	—	3.0 (20.7)	3.4 (23.4)	—	16.5 (117)	—	—
Compression strength, ksi (MPa)	200 (93)	—	—	43.8 (302)	49.5 (341)	48 (331)	—	—	—	—
Compression modulus, msi (GPa)	200 (93)	—	—	2.8 (19.3)	2.7 (18.6)	3.2 (22.1)	—	—	—	—
Compression interlaminar shear strength, ksi (MPa)	RT	—	—	9.5 (61)	9.8 (63)	10 (68.9)	—	13.0 (89.6)	—	—
Compression interlaminar shear strength, ksi (MPa)	160 (71)	—	—	—	7.7 (53)	7 (48)	—	10.4 (71.7)	—	—
Compression interlaminar shear strength, ksi (MPa)	200 (93)	—	—	6.8 (47)	6.2 (43)	5.4 (37)	—	—	—	—
Flatwise tensile strength, psi (kPa)	75 (24)	800 (5516)	749 (5164)	846 (5833)	874 (6026)	780 (5378)	—	670 (4620)	—	940 (6481)
Flatwise tensile strength, psi (kPa)	160 (71)	600 (4137)	640 (4413)	—	799 (5509)	700 (4826)	—	—	—	—
Flatwise tensile strength, psi (kPa)	200 (93)	—	—	657 (4523)	659 (4544)	610 (4206)	—	—	—	—
Long beam flexure, lb (kg)	75 (24)	65 (29.5)	129 (58.6)	122 (55.5)	112 (50.9)	216 (98.2)	—	—	—	—
Long beam flexure, lb (kg)	160 (71)	5.5 (25)	107 (48.6)	—	104 (47.3)	177 (80.4)	—	—	—	—
Long beam flexure, lb (kg)	200 (93)	—	—	93 (42.3)	85 (38.7)	165 (75.1)	—	—	—	—
Drum pool, in-lb/3" width (cm-kg/7.6 cm)	75 (24)	8 (9.2)	29 (33)	11 (13)	14 (16)	14 (16)	—	—	—	—

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



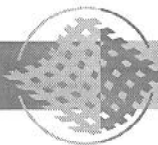
Cure Procedure

- 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 released and the test panel removed from the autoclave and debagged.

* * Typical for Hexcel HRIH® 10 - 1/8 - 3.0 honeycomb.

Storage

HexPly® F155 has a storage life of 180 days from date of receipt when stored at 10°F (-12°C), plus a handling life of 200 hours at 75°F (24°C) and mechanical life of 200 hours at 75°F (24°C).



HexPly® F155 *Product Data*

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.

Corrosion of Potential

A need for the management of corrosion potential is necessary when graphite composites are placed in contact with metallic honeycomb, skins, or fasteners.

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:

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

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>.