HexPly® 954-3

350°F (177°C) curing cyanate matrix

HEXCEL®

Product Data Sheet

Description

HexPly® 954-3 is a 350ºF (177ºC) curing cyanate resin with excellent resistance to moisture absorption, outgassing and microcracking. HexPly® 954-3 is formulated for autoclave or press molding using a standard cure of two hours at 350ºF (177ºC). Glass transition temperature can be maximized by post curing at 450ºF (232ºC). The recommended lay-up procedure is HSP-L3. The recommended cure procedure is HSP-C1 or HSP-C2.

Typical applications for HexPly® 954-3 include primary and secondary space structures and other applications where dimensional stability is critical.

Features

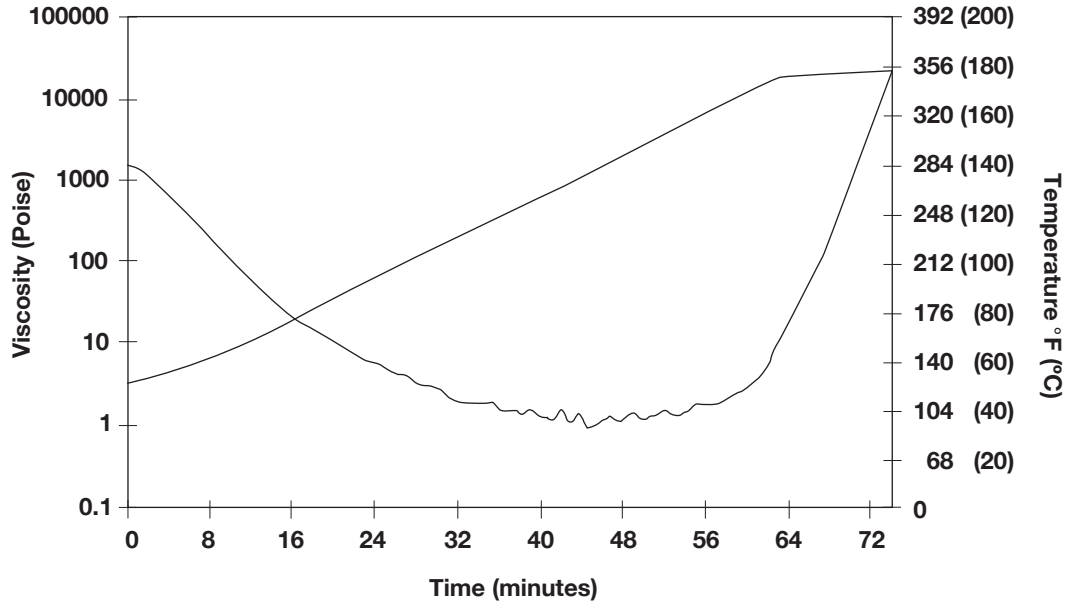
- Low moisture absorption
- Excellent resistance to microcracking
- Low outgassing
- Very low minimum viscosity
- Attractive electrical properties
- 350ºF (177ºC) cure
- Available on broad range of fibers and in forms including tape and fabric, and tow
- Autoclave or press mold processable

Typical Neat Resin Properties

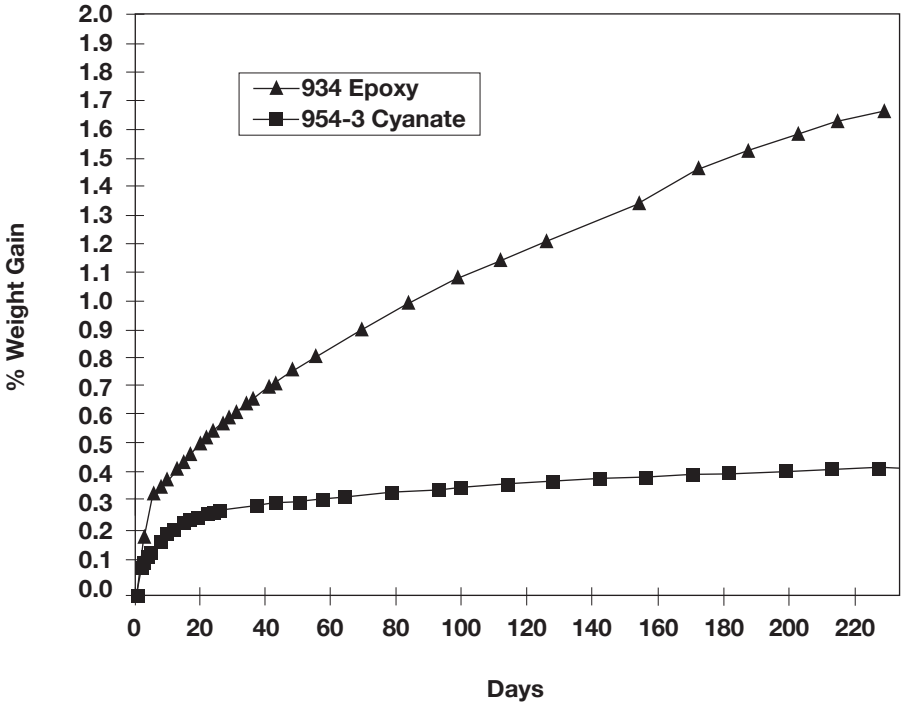
Properties		RT	325ºF (163ºC)	325ºF Wet
Tensile Strength	**ksi**	8.2		
	MPa	57		
Tensile Modulus	**Msi**	0.4		
	GPa	2.8		
Tensile Ult. Strain	**%**	2.4		
Flex Strength	**ksi**	17.3	12.6	11.2
	MPa	119	87	77
Flex Modulus	**Msi**	0.43	0.33	0.30
	GPa	3.0	2.3	2.1
Tg (DMA- δ)	**ºC**			
no post cure		206		
with post cure		258		
Density	**g/cc**	1.19		
CTE	**µin/in ºF**	30.6		

Notes: *(1) Post-cured 2 hours at 450ºF (232°C)*
(2) Wet = 7 day immersion at 160ºF (71°C)

HexPly® 954-3 Viscosity Profile [Ramp to 350°F (177°C) and hold]



HexPly® 954-3 Neat Resin Moisture Absorption at RT/50% RH (compared to 934 epoxy)



The data tested has been obtained from carefully controlled samples considered to be representative of the product described. Because the properties of this product can be significantly affected by the fabrication and testing techniques employed and since Hexcel does not control the conditions under which its products are tested and used, Hexcel cannot guarantee that the properties listed will be obtained with other processes and equipment.

Dimensional Stability

	954-3[1]	954-3[2]
Hygrostrain, ppm	18.9	108
Water Absorption, %	0.18[3]	0.70[4]
CME, ppm %	105	155

Notes: Hygrostrain divided by %M = CME
Pseudo-isotropic P75 laminates; 30% RC

[1]R. Brand and E. Derby; SPIE conf, 1690, 309. April 1992 (Composite Optics, Inc.)
[2]C. Blair and J. Zakrzewski, SPIE Conf. 1690, 300. April 1992 (Lockheed MSC)
[3]55% RH/EQ
[4]50% GH/EQ

HexPly® 954-3 Resin Outgassing

	954-3	ASTM LIMITS
Total Mass Loss, %	0.20	1.0
Volatile Condensable Mat'l	0.01	0.1
Water Vapor Recovered	0.04	-

Notes: Tested per ASTM E 595

HexPly® 954-3 Neat Resin Dielectrical Properties

Dielectric Properties	RT	325°F (163°C)
Unconditioned		
Dielectric Constant (Dk)	2.73	2.73
Loss Tangent (Df)	0.006	0.008
Moisture Conditioned* (1)		
Dielectric Constant (Dk)	2.85	2.85
Loss Tangent (Df)	0.01	0.02

Notes: Moisture Conditioned: 160ºF (71ºC) and 95% RH for 140 days.
Resin specimens cured at 350ºF (177ºC) for 2 hours and post-cured at 428ºF (220ºC) for 2 hours.
Tested to STM 2520D at 10.0 GHz.

Typical Mechanical Properties (Various Fibers)

Properties		Fibers (Average Values)					
		G80-600	M55J	M60J	YSH-60A	K13C-2U	K1100
0 Tensile Strength	**ksi**	323	334	312	332	267	190
	MPa	*2227*	*2303*	*2151*	*2289*	*1841*	1310
0 Tensile Modulus	**Msi**	44	47	53	57	78	82
	GPa	*303*	*324*	*365*	*391*	*538*	565
90 Tensile Strength	**ksi**	5.7	5.0	-	4.7	3.0	-
	MPa	*39*	*35*	-	*32*	*20*	-
90 Tensile Modulus	**Msi**	0.80	0.90	-	5.6	0.73	-
	GPa	*5.5*	*6.2*	-	*38*	*5.1*	-
0 Comp. Strength	**ksi**	131	138	134	69	53	39
	MPa	*903*	*951*	*924*	*476*	*366*	269
0 Comp. Modulus	**ksi**	43	44	50	49	76	82
	GPa	*296*	*306*	*343*	*335*	*525*	565
0 IL Shear Strength	**ksi**	10.5	11.6	11.3	9.4	6.9	3.4
	MPa	*72*	*80*	*78*	*65*	*47*	23

Notes: 0 degree tensile and compression values are normalized to 60% fiber volume.
All testing performed at RT.

Thermal Cycle Evaluation

Materials	0 Cycles # cracks/in.	10 Cycles # cracks/in.	50 Cycles # cracks/in.	100 Cycles # cracks/in.
954-3/M55J, 0º	0	0	0	0
954-3/M55J, 90º	0	0	1.25	1.25

Notes: Laminate configuration is (45, -45, 0, 90)4S
Thermal cycle: -250ºF (-157°C) to 250ºF (121°C) at 20ºF/min, 5 minutes hold.

Shelf Life / Out Life

Shelf Life	6 months (maximum from date of manufacture)
Out Life	14 days

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

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