COI Materials
Prepreg · Laminates · Core
Specialty Fibers

CE3 Cyanate Ester Pitch Based Carbon Prepregs

350° Cure Toughened Cyanate Ester

Product Summary:

CE3 is a 350° curing, modified cyanate ester resin that delivers composite toughness along with excellent hot/wet performance. CE3 translates well into both PAN based and pitch based carbon fiber properties. Due to its low coefficient of thermal expanion (CTE) and outgassing properties, it is an ideal prepreg resin system for space related hardware structures.

Features:

- Low Areal Weight Tapes & Fabrics
- Low Coefficient of Thermal Expansion
- Low Moisture Absorption
- Low Outgassing
- Good Tack / Handleability
- Epoxy-like Processing

Laminate Properties:

	Unit	Typical
Physical Properties		
Tg (TMA) - no post cure	℃	198
Outgassing (ASTM E-595)		
TML	%	0.15
CVCM	%	0.02
WVR	%	0.11

		FABRIC	*TAPES*							
	Unit	FP3A107	K63312		K13710		K63712		K1392U	
Mechanical Properties - *normalized 60% fiber volume**										
Laminate Orientation		0°	UNI	QI	UNI	QI	UNI	QI	UNI	QI
0° Tensile Strength*	ksi	120.9	200.6	79.6	222.7	59.5	267	74	273.3	88.6
0° Tensile Modulus* (ASTM D3039)	Msi	32.2	24.7	10.5	56.1	17.6	60	20	67.9	23.1
90° Tensile Strength	ksi	-	3.9	-	-	-	3.7	-	3.9	-
90° Tensile Modulus (ASTM D3039)	Msi	-	0.8	-	-	-	0.7	-	0.7	-
0° Compression Strength*	ksi	32.0	65.9	44.5	59.6	41.1	61	34	70.5	35.2
0° Compression Modulus* (ASTM D695)	Msi	32.5	20.5	9.1	45.8	16.3	50	16.8	57.3	20.8
Shear-Inplane Strength*	ksi	13.4	10.6	2.6	-	-	11.7	29.2	11.2	-
Shear-Inplane Modulus* (ASTM D5739)	Msi	0.7	0.7	2.4	-	-	0.7	5.3	0.72	-
Short Beam Shear (ASTM D2344)	ksi	5.1	10.0	22.61	10.8	5.4	10.3	-	9.0	-
3-Point Flexure Strength	ksi	-	-	-	111.0	74.5	-	-	-	-
3-Point Flexure Modulus (ASTM D790)	Msi	-	-	-	41.7	17.1	-	-	-	-
Flatwise Tension (ASTM C297)	psi	-	3259	3523	-	-	3477	4498	3123	3477
Coefficient of Thermal Expansion										
CTE (0° direction)	ppm/°F	-0.341	-0.441	0.654	-	-0.19/-0.21	-0.48/-0.743	-0.234/-0.285	-0.725	-0.411
Fiber Volume	%	46	49	47	-	50/54	52/58	50/55	54	53.4

UNI = Unidirectional $[0]_n$
QI = Quasi-Isotropic $[0/45/90/135]_{sn}$

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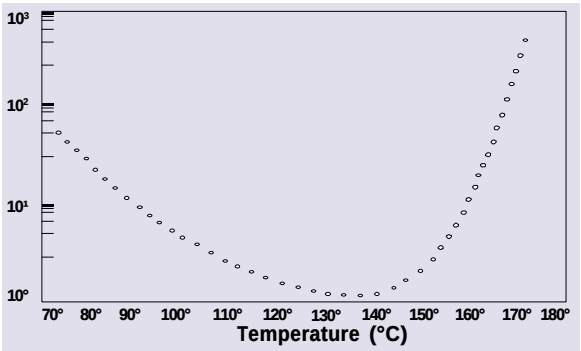
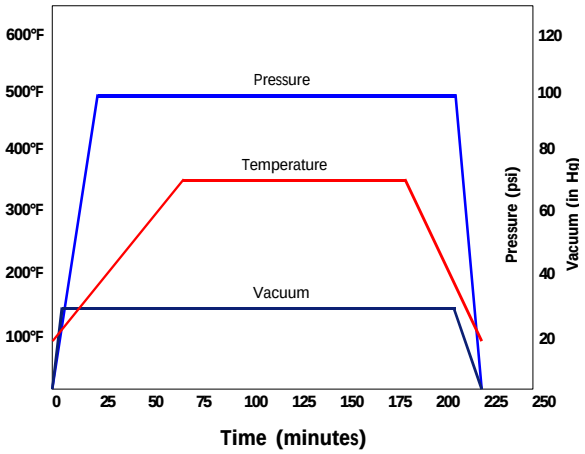
CE3 Neat Resin Properties:

Specific Gravity g/cc	1.19
Tg Dry, °C (°F)	
No Post Cure	206 (403)
With Post Cure	258 (496)
CTE, ppm/°F (-175°F - 175°F)	29
Tensile Strength, ksi	9.2
Tensile Modulus, msi	0.44
Ult Tensile Strain, %	2.4
Flexural Strength, ksi	21.9
Flexural Modulus, msi	0.73
Outgassing	
TML, %	0.31
CVCM, %	0.01

Viscoscity Profile (2°C/min)



Autoclave Cure Cycle



A typical cure cycle for CE3 prepregs is as follows:

A. Apply vacuum
B. Apply 100 psi pressure
C. Raise temperature to 350°F at a rate of 2-5°F/minute and hold for 120 minutes
D. Cool at a maximum rate of 10°F/minute to 150°F or below
E. Release pressure and vacuum

Optional Postcure (freestanding, oven):

A. Raise temperature from ambient to 350°F at 5-10°F/minute, followed by a maximum heatup rate of 3°F/minute maximum to 450°F
B. Hold at 450°F for 2 hours

Handling Precautions

COI Materials recommends that each of its customers observe industry prescribed precautions for handling prepreg materials. Personnel working with this product should wear clean impervious gloves to reduce the chance of skin contact and to eliminate contamination of the material.

Storage

COI Materials recommends that CE3 prepreg be sealed in Mil-B-131 bags and refrigerated at or below 0°F. Following removal from cold storage, prepreg should be allowed to achieve room temperature before the bag is opened, thus avoiding moisture condensation. Shelf life is 12 months at 0°F.

For Industrial Use Only

Overall product design, the processing and environmental conditions, and other factors should be considered when determining whether the material is suitable for a particular application. In lieu of all warranties, express or implied, COI Materials' only obligation shall be to replace such quantity of this product which has proven to not substantially comply with data presented in this document. If a non-conforming product is discovered, COI Materials shall not be liable for any commercial loss or damage, be it direct or consequential, arising out of the use of or the inability to use the product. Before using, customer shall determine the suitability of the product for its intended use, and the customer assumes all risks and liability in connection therein. Statements relating to possible use of our product are not guarantees that such use is free of patent infringement or that they are approved for such use by any government agency. The foregoing conditions may not be changed except by an agreement signed by an officer of COI Materials, Inc.

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