COMPOSITE TECHNOLOGIES
TECHNICAL DATA SHEET

AX-170

Cyanate Ester Prepreg

Product

AX170 is a high temperature cyanate ester prepreg for making structural composites offering good mechanical performance at operating temperatures up to 316°C (600F). AX170 prepregs can be cured over a range of initial cure temperatures, from 127 °C to 177 °C (260 F to 350 F). The cured part is then post cured to develop a high glass transition temperature (Tg). Fully post cured structures and components can be used at service temperatures up to 260°C (500F) with excursions up to 316 °C (600 F).

Typical Applications

» Low dielectric constant and low dissipation factor for radome applications
» Structures for motorsport and defense applications requiring service temps up to 316°C (600 F)
» Resistance to out gassing for space applications
» Inherently flame retardant
» May be cured using autoclave, oven vacuum bag, or press molding processes
» Versatile cure from 127 °C to 180 °C (260 F to 350 F) with a free standing post cure

Product Categories and Location of Production

Product Category	Description	AXIOM MATERIALS	KORDSA
AX-3170	Fiberglass Fabric (E-Glass, Quartz)	✓	✓
AX-5170	Carbon	✓	✓
AX-6170	Unidirectional Tape	✓	✓
AX-6170-Slit	Slit Tape	✓	✓

Typical Prepreg Properties

Property	Results
Resin Content	35-40% (AX-3170) 35-42% (AX-5170) 33-39% (AX-6170)
Volatile Content	<1%
Gel Time@121°C (250°F)	15-20 mins
Tack Level	Medium to High

Resin Matrix Properties

Property	Test Method	Value
Resin Density	ASTM D792	1.19 g/cm^3
Resin Color	N/A	Naturally White

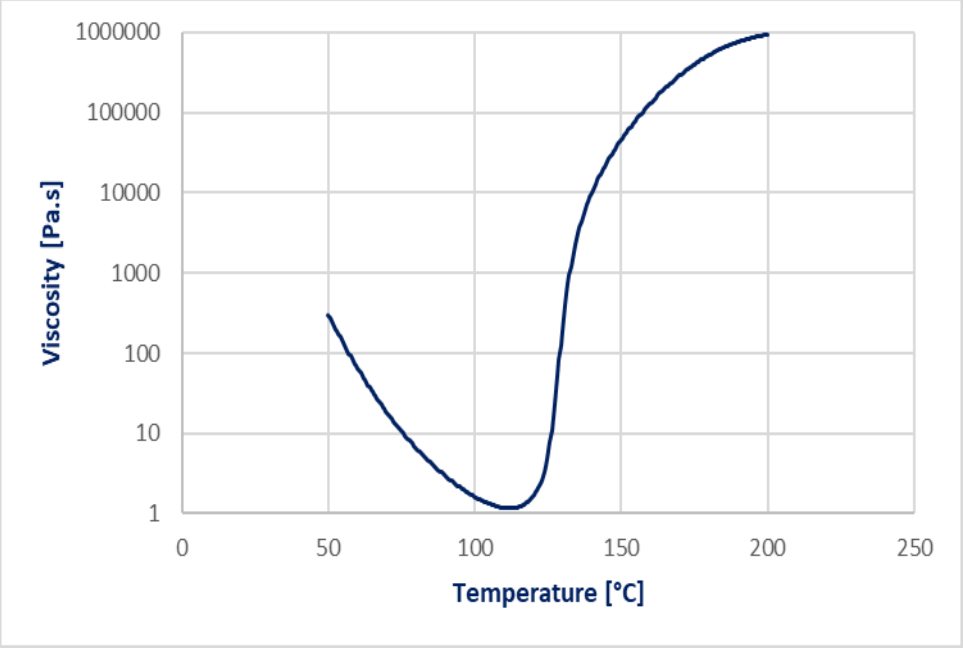


Figure 1. Rheology of AX-170

Recommended Cure Cycles

Autoclave Cure Cycle	
Vacuum Bag Pressure	>25 in. Hg
Autoclave Pressure	50-100 psi
Temperature Ramp Rate	RT to 127°C (260°F) @ 1-5°F/min
Dwell Temperature	127°C ± 6°C (260°F ± 10°F)
Dwell Time	120 mins minimum
Cool Down	Under pressure below 60 °C (140°F)

Temperature heat up and cool down under pressure is recommended, but not mandatory.

Post Cure Options

The part after initial cure is typically free-standing post cured.

The post cure ramp rate is no faster than 0.5°F to 1°F per minute if free standing.

Thicker parts should use several holds to reduce exotherm heating.

Peak operating temperatures depend on post cure temperature:

Post Cure Temp	Dwell Time	Service Temp
177°C (350°F)	2 hours	-55 to 204°C (-67 to 400°F)
232°C (450°F)	2 hours	-55 to 260°C (-67 to 500°F)
288°C (550°F)	2 hours	(-55) to 316°C (-67 to 600°F)

Alternative Cure Cycle for Higher Tg

Autoclave Cure Cycle	
Vacuum	(-650)-(-450) mmHg
Autoclave Pressure	7 ±0.2 Bar
Temperature Ramp Rate	0.5-1.5 °C/min
Dwell Temperature	70 ±5 °C
Dwell Time	15-45 min
Curing Temperature	180±5 °C
Hold Time	120-180 min
Cool-down Rate	0.5-2.5 °C/min
Natural Pressure Drop After	4±0.2 Bar
Autoclave Opening Temperature	Lower than 60°C

Temperature heats up and cool down under pressure is recommended, but not mandatory.

Post Cure Cycle	
Pressure	N/A
Oven Atmosphere	Air
Heat-up Rate	0.25 - 0.5 °C/min
Curing Temperature	288±5 °C
Hold Time	120-180 min
Cool-down Rate	0.25-1.0 °C/min
Natural Pressure Drop After	N/A
Autoclave Opening Temperature	Lower than 60°C

Typical Outgassing Properties per ASTM E595

Specimen	Cyanate Type	Total Mass Loss (TML)	Collected Volatile Condensable Material (CVCM)	Water Vapor Release (WVR)
AX-170 Resin*	High Temp (316°C use)	0.47%	0.01%	0.25%
Standard Cyanate Ester Resin**	Medium Temp (204°C)	0.40%	0.01%	0.22%

*The AX-170 resin was cured at 316°C.

**The standard cyanate ester resin was cured at 204°C.

Physical and Mechanical Properties *(Examples only. For the wider prepreg range, please contact Kordsa)*

AX-170AD-8HS Quartz Fabric RC 40% expected properties when cured 180°C (356°F) / 150 minutes, and post cured 288°C (550°F) / 180 minutes

Property	Standard	Test Temperature	Property	285gsm 8HS Quarzt
Tensile	ASTM D3039	25°C	0° Tensile Strength MPa (ksi)	830 (120.3)
			0° Tensile Modulus Gpa (msi)	25 (3.6)
Compression	ASTM D3410	25°C	Strength MPa (ksi)	480 (69.6)
Shear, Interlaminar	ASTM D2344	25°C	0° Shear Strength MPa (ksi)	60 (8.7)
DMA[1]	EN6032	-	Tg Onset (°C)	335

[1] Dry Conditioning Procedure: Dry at 105°C (221°F) for 1 week

AX-3170-4581 RC 38% expected properties when cured 127°C (260°F) / 2 hours, and post cured 288°C (550°F) / 2 hours

Property	Standard	Test Temperature	Property	4581 AQ3
Flextural	ASTM D790	25 °C[1]	Strength MPa (ksi)	839 (120)
		316 °C[1]	Strength MPa (ksi)	690 (100)
Tensile	ASTM D638	25°C[1]	Strength MPa (ksi)	620 (90)
			Modulus Gpa (msi)	26 (3.8)

[1] Dry Conditioning Procedure: Dry at 160°F for 120-130 hrs

AX-5170-284 RC40% expected properties when cured 260°F / 2 hours & then post cured 550°F / 2 hours.

Property	Standard	Test Temp.	Property	Style 284
Flextural	ASTM D790	25 °C[1]	Strength MPa (ksi)	900 (130)
		260 °C[1]	Strength MPa (ksi)	550 (80)
Short Beam Shear Strength	ASTM D2344	25 °C[1]	Strength MPa (ksi)	55 (8.0)
		260 °C[1]	Strength MPa (ksi)	34 (5.0)

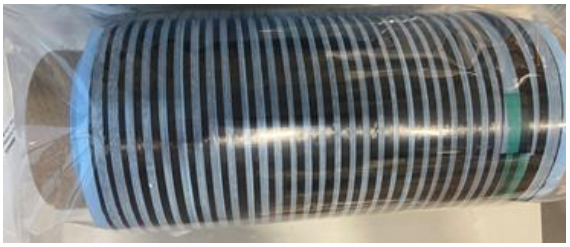
[1] Dry Conditioning Procedure: Dry at 160°F for 120-130 hrs

AX6170MT 34700HT 24K UD150 RC35% expected properties when cured 121°C / 2 hours & then post cured 288°C / 2 hours.

Property	Standard	Test Temp.	Property	AX6170
Tensile	ASTM D3039	25 °C[1]	0° Tensile Strength MPa (ksi)	1725 (250)
			0° Tensile Modulus Gpa (msi)	125 (18.1)
			90° Tensile Strength MPa (ksi)	102 (14.8)
			90° Tensile Modulus Gpa (msi)	10 (1.5)
		(-) 53°C[1]	0° Tensile Strength MPa (ksi)	1737 (252)
			0° Tensile Modulus Gpa (msi)	129 (18.7)
Compression	ASTM 6641	25 °C[1]	0° Compressive Strength MPa (ksi)	1253 (182)
			0° Compressive Modulus Gpa (msi)	117 (16.9)
			90° Compressive Strength MPa (ksi)	102 (14.8)
			90° Compressive Modulus Gpa (msi)	10 (1.5)
			[90°/0°]ns Compressive Strength MPa (ksi)	552 (80)
			[90°/0°]ns Compressive Modulus Gpa (msi)	66 (9.6)
	ASTM 6641	(-) 53°C[1]	[90°/0°]ns Compressive Strength MPa (ksi)	624 (90)
			[90°/0°]ns Compressive Modulus Gpa (msi)	56 (8.1)
Shear, Interlaminar	ASTM D2344	25 °C[1]	0° Shear Strength MPa (ksi)	109 (15.8)
		83 °C[2]	0° Shear Strength MPa (ksi)	95 (13.7)
Shear, In-plane	ASTM D3518	25 °C[1]	[+45°/-45°]ns Shear Stress MPa (ksi)	71 (10.3)
		83 °C[2]	[+45°/-45°]ns Shear Stress MPa (ksi)	71 (10.3)

[1] Dry Conditioning Procedure: Dry at 160°F for 120-130 hrs
[2] Wet Conditioning Procedure: In distilled water at 70 °C for 14 days

Slit Tape General Information

Resin System	AX6170MT
Fiber Material	3K, 12K, 24K
Winding Type	Traverse 

Physical Features

Feature	Unit mm	Tolerance mm	Unit ınch	Tolerance inch
Slit Width	3,175	+/- 0,127mm	0,125	+/- 0,005”
Slit Width	6,35	+/- 0,127mm	0,25	+/- 0,005”
Slit Width	12,7	+/- 0,127mm	0,5	+/- 0,005”

Packaging

Liner Type	PE Film
Core diatemer	3 inches

Warning About Cyanate Ester Prepreg Pre-Cure Moisture Susceptibility

Cyanate ester prepregs have a well-known susceptibility to pre-cure moisture which can lead to carbon dioxide formation and poor composite parts. Therefore, follow these procedures:
Minimize exposure to moisture prior to, and during cure, as it can affect the cured matrix and Tg of the cured composite. Don't allow the prepreg or uncured part lay-up exposed to atmospheric moisture for long periods of time.
The tool, if composite, must be carefully dried by heating at 250°F (121°C) for 12 hours or longer for thick tools immediately prior to use.
Cyanate ester prepregs are susceptible to moisture absorption after the initial cure prior to free-standing post cure, which can lead to degradation of the composite. Therefore, the post cure should be immediately conducted after the initial cure. If this is not possible, the post cure must include a drying step of holding the part at 250°F (121°C) for 12 hours before raising the temp to post cure temperature at no faster than 0.5°F to 1°F per minute.

Recommended Storage

Shelf life is from date of manufacturing according to storage temperature below. Working life is the cumulation of time outside of storage temperature.

Storage Condition	AX-170
Shelf Life at -18ºC (0 ºF)	6 months
Working Life at 24ºC (75ºF)	21 days

Handling & Safety Instructions

»Store prepreg suspended horizontally to avoid flat spots and thinning under the weight of the roll.
»Allow product sufficient time (4-6 hours) to reach ambient temperatures after removal from cold storage to prevent condensation on the prepreg surface.
»Use the appropriate safety equipment for this product.
»Refer to the AX-170 Safety Data Sheet for specific safety instructions.

Technical Assistance

In a bind? Call us anytime. We provide fast and knowledgeable technical support:

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