Product Overview

F-502 Phenolic Prepregs

Park's F-502 is a MIL-R-9299 phenolic resin system suitable for impregnation on any MIL-C-9084 fabric with a compatible finish. F-502 is used in the manufacture of ablative reinforcements in rocket nozzles, as well as ducting and secondary structures.

Key Features & Benefits

- Provides a combination of high-strength and ablative properties for demanding applications
- Low thermal expansion
- Good Tack and Drape properties
- Conforms to MIL-R-9299 Type B

Product Forms

- Available on a wide variety of reinforcements, including fiberglass, graphite, and quartz.
- Also available as a Molding Compound and Bias Tape
- Solution coated fabrics up to 60 inches wide
- Compatible with Autoclave or Press Molding processes

Applications / Qualifications

- Rocket Nozzles
- Ducting
- Secondary Structures

Qualified Specifications

- GMS4001

Global Availability

For Information about Park's materials:

Americas	+1.316.283.6500
Asia Pacific	+656.861.7117
Europe	+33-562-985290

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PARK ELECTROCHEMICAL CORP.

Technical Datasheet

F-502 Phenolic Prepregs

Prepreg Physical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7628 E-Glass	7781 E-Glass	581 Quartz	Silica
Fabric Area Weight (gsm)	617	300	203	303	475	610
Prepreg Resin Content (%)	32 – 38	32 – 38	36 – 44	31 – 37	33 – 39	31 – 37
Resin Flow (325°F, 15 psi) (%)	10 – 25	5 – 20	20 - 32	5 – 20	5 – 20	10 - 30
Volatiles (275°F, 8 min) (%)	2 – 8	3 – 5	5 – 8	2 – 5	2 – 5	6 – 10
Gel Time (sec)	50-200	50-200	50-100	50-100	50-200	50 - 100

Prepreg Storage Life

Out Life: 30 days @ 75°F

Shelf Life: 6 months @ 0°F and 3 months @ 40°F (dry)

**Store F502 Silica at 0°F (dry)

Cured Laminate Physical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7781 E-Glass	581 Quartz	Silica
Per Ply Thickness	0.016	0.010	0.009	0.012	0.028
Specific Gravity *ASTM-D-792*	1.35	1.45	1.75	1.70	1.7
Hardness (Barcol) *ASTM-D-2583*	75	75	70	75	70
Specific Heat (btu/lb°F) *ASTM-C-351*	--	--	0.28 *(@ 150°F)*	0.20 *(@ 75°F)*	--
CTE - with ply 80 - 400°F (ppm/°F) *ASTM-D-696*	--	--	--	4.5	--
CTE – x-ply 80 - 400°F (ppm/°F) *ASTM-D-696*	--	--	--	19.0	--

All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a Park representative directly. Park reserves the right to change these values based on a nature process of refining our testing equipment and techniques.

Technical Datasheet

F-502 Phenolic Prepregs

Laminate Mechanical Properties

Reinforcement	3K 8HS PAN	12K GA090 UniTape	7781 E-Glass	581 Quartz	Silica
Cure Cycle	325°F Autoclave	325°F 1000 psi	325°F Autoclave	325°F Autoclave	325°F 1000 psi
Tensile Strength, 0° (Ksi)					
75°F Dry	89	225	51	60	13
500° Dry	--	--	48	--	--
ASTM-D-638					
Tensile Modulus, 0° (Msi)					
75°F Dry	8.6	14	3.7	3.5	2.4
500° Dry	--	--	2.9	--	--
ASTM-D-638					
Compressive Strength (Ksi)					
75°F Dry	77	100	67	65	24
500° Dry	--	--	38	--	--
ASTM-D-695					
Compressive Modulus (Msi)					
75°F Dry	9.3	14	3.5	3.6	2.4
500° Dry	--	--	3.0	--	--
ASTM-D-695					
Flexural Strength (Ksi)					
75°F Dry	112	--	71	85	23
500° Dry	--	--	40	--	--
ASTM-D-790					
Flexural Modulus (Msi)					
75°F Dry	8.1	--	3.6	3.5	2.5
500° Dry	--	--	2.7	--	--
ASTM-D-790					
Short Beam Shear (Ksi)					
75°F Dry	4.8	--	--	--	--
ASTM-D-5379					

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Processing Guidelines

F-502 Phenolic Prepregs

Autoclave Cure Cycle

- Apply 24"Hg vacuum (minimum) for 1 hour before beginning heat cycle
- Apply 10 psi autoclave pressure
- Raise product temperature from RT to 250°F at 2 - 5°F/min
- Increase autoclave pressure to 40psi, vent vacuum at 15 – 20 psi
- Hold product at 250 ± 5°F for 30 minutes
- Raise product temperature to 325 ± 5°F at 2 - 5°F/min
- Hold product at cure temperature for 60 – 90 minutes
- Cool to 150°F at no more than 8°F/min prior to releasing autoclave pressure

Optional Post Cure Cycle for High-Temp Applications

- Heat Rise Rate between soak temperature: 2 – 8 °F/min
    - 250°F for 2 hours
    - 300°F for 1 hour
    - 350°F for 1 hour
    - 400°F for 1 hour
    - 425°F for 1 hour
    - 450°F for 2 hours

Note: The following guidelines are provided to assist Park material users with general recommendations for successful processing. The recommendations are for general review purposes only and process adjustments may be required to achieve optimum results in your specific manufacturing environment.

High Silica Phenolic Autoclave Cure Cycle

- Apply 24"Hg vacuum (minimum) for 1 hour before beginning heat cycle
- Raise product temperature from RT to 200°F at 2 - 6°F/min
- Apply autoclave pressure of 100 psi, vent vacuum at 15-20 psi
- Raise product temperature to 350°F at 2 – 6°F /min
- Hold product at 350 ± 5°F for 60 - 90 minutes
- Cool to 150°F at 8°F/min prior to releasing autoclave pressure
- Post Cure
    - Heat Oven to 350°F at 2 – 8°F /min and hold for 2 hours
    - Hold product at 400°F for 4 hours